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JUNE, 1982 **FINAL REPORT**

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Accession Numbers 474 -888

LITERATURE AND DATA SEARCH OF WATER RESOURCE INFORMATION OF THE COLORADO, UTAH, AND WYOMING OIL SHALE BASINS

LEWIN AND ASSOCIATES, INC.
Denver, Colorado Washington, D.C.

BUREAU OF LAND MANAGEMENT

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Compiled By

Lewin and Associates, Inc.

Denver, Colorado Washington, D.C.

For The

Colorado State Office

Bureau Of Land Management

U. S. Department Of Interior

Denver, Colorado

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JUNE 1982

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Volume 8: Colorado Data Compilations

Volume 9: Utah Data Compilations

Volume 10: Wyoming I Data Compilations

Volume 11: Wyoming II Data Compilations

Volume 12: Process Water Use

ABSTRACT

Accession Number:
@ 474
Ingram, H., 1978, Politics of water allocation (Colorado River basin): in Peterson, D.F., and Crawford, A.B., eds., Values and choices in the development of the Colorado River basin, University of Arizona Press, p. 61-75.

Contact: University of Arizona Press (copy)

Key Categories: COLORADO, UTAH, WYOMING, WATER LAW

Access Code: 002 Use Code: 03

This author maintains that federal domination of decisions on water allocation has imposed costs upon the Colorado River basin in terms of the quality of the decision making process and the rationality of water policy. Her arguments are based on consideration of costs to the basin of federal water development: e.g. limitations of choice imposed on regional equity and by federal initiatives; the bias of choice introduced by federal evaluation; information affected by federal standards and limited by pressure toward unity as well as by pressure for early action; and finally lack of incentive for state planning and the inadequacies of federal water policies pursued. She concludes by giving evidence of change within the basin, particularly evidence that the grip which federal water politics has had upon the basin may be loosening, with the proportion of federal investment in western water development showing a decline. Nevertheless, account must be taken of the fact that much future planning is still taking place on the federal level or within corporations based outside the basin which basin decision-makers find difficult to hold accountable. She makes a final plea to try again to achieve a basin-wide setting of goals and objectives so that proposed resources projects can be evaluated in light of the kind of future the Colorado River basin envisions for itself.

ABSTRACT

Accession Number:
@ 474.1
INTERCOMP Resource Development and Engineering, Inc., 1976, A model for calculating effects of liquid waste disposal in deep saline aquifers, part II--development: U.S. Geological Survey Water-Resources Investigations 76-61, 194 p.

Contact: Public Inquiries Office (copy)

Key Categories: COLORADO, COMPUTER MODELS

Access Code: 002 Use Code: 01

A transient, three-dimensional subsurface waste-disposal model has been develo to provide methodology to design and test waste-disposal systems. The model is a finite-difference solution to the pressure, energy, and mass-transport equations. Equation parameters such as viscosity and density are allowed to be functions of th equations' dependent variables. Multiple user options allow the choice of x, y, an z cartesian or r and z radial coordinates, various finite-difference methods, iterative and direct matrix solution techniques, restart options, and various provisions for output display.

The addition of well-bore heat and pressure-loss calculations to the model mak available to the ground-water hydrologist the most recent advances from the oil and gas reservoir engineering field.

ABSTRACT

Accession Number:
@ 474.2
U.S. Dept. of Interior, March 1982, 1982 report on the prototype oil shale leasing program, Jan. 1, 1980 through Dec. 31, 1981: Minerals Management Service, Grand Junction, CO., 79 p.

Contact: Pete Rutledge (copy)

Key Categories: COLORADO, UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 02

This management report summarizes progress on the federal lease tracts C-a, C-b, and U-a/U-b. It presents process development and environmental monitoring status on these tracts and a good summary of proposed oil shale developments in Colorado.

ABSTRACT

Accession Number:
@ 475
U.S. Dept. of Interior, Jan. 1981, Quality of water, Colorado River basin: Progress Report No. 10, 190 p.

Contact: USBR-Salt Lake City (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 011 Use Code: 01

This report prepared and updated every two years presents the various important water quality aspects of the Colorado River. Although several water quality parameters are discussed, the major part of the report is allotted to salinity (total dissolved solids) because it is presently the most serious quality problem on the river system. The historical, present modified, and future salinity conditions of the waters of the Colorado River down to Imperial Dam are presented in this report. The historical is represented by a tabulation of the recorded or estimated past condition at 20 quality of water stations for the 1941-78 period. Although various other studies have included different period of records such as the 1906 to present period, this report has used the 1941-78 period because most salinity records in the basin do not extend back beyond about 1941. The present (1978) modified condition includes adjustments to the historic condition based on the assumption that all developments existing in 1978 were in operation for the full 1941-78 period. Estimated future conditions are shown for the years 1990, 2000 and 2010. They are estimated projections, including past projects, presently authorized developments, projects proposed for authorization, and other future anticipated projects. The Colorado River Simulation System (CRSS) was used for future water quality projections. A description of the model is given along with the projections.

The CRSS flow and salinity projections in Table F and Table G, Part X, Special Studies section are considered preliminary for several reasons. They hydrologic data base for the computer model was not completed beyond 1974. It was intended to use a data base from 1906 to 1978. Also, time did not allow thorough checking of the projections against the input data to insure proper operation of the model. The projections found in Table D based on annual averages remain our best estimate at this time.

ABSTRACT

Accession Number:
@ 475.1
U.S. Dept. of the Interior, Jan. 1979, Quality of water, Colorado
River basin: Progress report no. 9, 206 p.

Contact: USBR - Salt Lake City (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, MODELS

Access Code: 011 Use Code: 01

This report prepared and updated every two years presents the various important water quality aspects of the Colorado River. Although several water quality parameters are discussed, the major part of the report is allotted to salinity (total dissolved solids) because it is presently the most serious quality problem on the river system. The historical, present modified, and future salinity conditions of water of the Colorado River down to Imperial Dam are presented in this report. The historical is represented by a tabulation of the recorded or estimated past condition at 20 quality of water stations for the 1941-76 period. Although various other studies have used different periods of records such as the 1906 to present, this report has used the 1941-76 period because most salinity records in the basin do not extend back beyond about 1941. The present (1976) modified condition includes adjustments to the historic condition based on the assumption that all developments existing in 1976 were in operation for the full 1941-76 period. Estimated future conditions are shown for the years 1980, 1990, and 2000. They are estimated projections, including past projects, presently authorized developments, projects proposed for authorization, and other future anticipated projects.

ABSTRACT

Accession Number:
@ 476
U.S. Dept. of Interior, 1976, Colorado River quality improvement
program: draft environmental statement.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 476.1
International Engineering Company, Inc., Jan. 1982, Yellow Jacket Project study, White River basin, Colorado, plan of study: report prepared for Colorado Water Conservation Board, Denver, Colorado.

Contact: Dan Law (copy)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN

Access Code: 011 Use Code: 02

The proposed Yellow Jacket Project will divert and store water from the White River above the confluence of Piceance Creek for municipal, energy, and other uses. This report presents a detailed plan of study to assess the feasibility of the Project. It was prepared to provide the Colorado Water Conservation Board with the administrative and technical procedures and criteria that will be used to carry out the study. It includes a background of the study, defines the objectives and scope, describes the study tasks and their interrelationships, presents the study management approach, outlines procedures to be followed, and lists the products to be produced. The technical work to be completed includes: (1) review and compilation of previous studies and available data; (2) determination of water availability; (3) determination of water needs and locations; (4) identification of storage sites; (5) formulation of alternative plans; and others.

ABSTRACT

Accession Number:
@ 478
U.S. Dept. of Interior, 1974, Report on water for energy in the Upper Colorado River basin: Denver, Colorado, Water for Energy Management Team, 71 p.

Contact: USGS - Library (loan)

Key Categories: WATER LAW, AVAILABLE WATER BY BASIN, PRESENT WATER USE, PROCESS WATER USE, COLORADO, UTAH, WYOMING

Access Code: 011 Use Code: 01

This report discusses water requirements and availability for coal-fired electric generating, oil shale, and coal gasification plants located in the Upper Colorado River Basin. The report tabulates pertinent data on active projects in 1974 and summarizes projected water requirements for each. Other future water needs, including basin exports, minerals, irrigation and municipal and industrial water, are identified and quantified. The ability of projected available supplies to meet these demands are assessed.

The report concludes that there will not be sufficient water in the Upper Basin to meet energy developments and other anticipated needs through the year 2000 unless certain State and Federal actions are taken. These actions include strong State leadership in resolving water rights and water allocations issues, additional storage facilities, and interim use of groundwater.

ABSTRACT

Accession Number:
@ 479
U.S. Dept. of Interior, 1973, Final environmental statement for the prototype oil-shale leasing program: Vol. I of VI, regional impacts of oil shale development, Washington, D.C., U.S. Government Printing Office.

Contact: U.S. Government Printing Office (copy)
Area Oil Shale Supervisor's Office (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL, CLIMATE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, PROCESS WATER USE, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 011 Use Code: 01

This is Volume I of the six-volume, final environmental impact statement for prototype oil shale leasing program. This volume provides an assessment of the state of oil shale technology in the early 1979s and describes the regional environmental impact of oil shale development at a rate of one million barrels per day by 1985. This volume includes chapters which discuss the proposed action (oil shale technology, environmental control); the environment of Colorado, Wyoming, and Utah (climate, geology, mineral resources, water resources, fauna, soils, vegetation, land use, etc.); environmental impacts (surface disturbance of land, impact on water resources, air qualify, fauna, agriculture); applicable environmental standards; adverse environmental effects which cannot be avoided; and others. The section on regional impacts on water resources assesses the probable magnitude of water requirements, groundwater plus surface water supplies, and the probable impact on the region's water resources. Boundaries on the supply-demand estimates are provided through contingency forecasts of possible future events.

ABSTRACT

Accession Number:
@ 480
U.S. Dept. of Interior, 1973, Final environmental statement for the prototype oil-shale leasing program: v. II of VI, energy alternatives, Washington, D.C., U.S. Government Printing Office.

Contact: U.S. Government Printing Office (copy)
Area Oil Shale Supervisor's Office (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This is Volume II of the six-volume, final environmental impact statement for the prototype oil shale leasing program. This volume identifies and describes several alternatives to the one million barrel per day shale oil industry described in Volume I (Abstract No. 479).

The initial sections consider the energy situation in the early 1970's, the role of energy in economic growth, and the energy requirements of the U.S. to meet projected future needs. To relate shale oil to the total energy picture, the subject of substitutability of energy in its solid, liquid, or gaseous forms is discussed, followed by a consideration of factors that affect fuels development. A background of the petroleum situation, both present and future, is presented followed by a consideration of oil shale development possibilities. Alternative to shale oil production, including increased domestic production of petroleum, artic oil and gas, nuclear stiumulation of natural gas reservoirs, increased LNG imports, coal, nuclear energy, tar sands, geothermal energy, and hydroelectric power, are presented and the associated environmental impacts are assessed. Combinations of these various alternatives are considered in the last section of this volume.

ABSTRACT

Accession Number:
@ 481
U.S. Dept. of Interior, 1973, Final environmental statement for the prototype oil-shale leasing program: v. III of VI, specific impacts of prototype oil shale development, Washington, D.C., U.S. Government Printing Office.

Contact: U.S. Government Printing Office (copy)
Area Oil Shale Supervisor's Office (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL, CLIMATE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, PROCESS WATER USE, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 011 Use Code: 01

This is Volume III of the six-volume, final environmental impact statement for the prototype oil shale leasing program. This volume examines the specific action under consideration, which is the issuance of not more than two prototype oil shale leases in each of the states of Colorado, Utah, and Wyoming. It focuses on the specific environmental impacts of prototype development on public lands which, when combined, could support a production of about 250,000 barrels per day.

This volume contains chapters which describe the leasing program, the baseline environmental conditions on the six lease tracts, mining and processing options likely to be used on the tracts, environmental impacts of tract development for underground mining with surface retorting, mitigating measures, adverse effects which cannot be avoided, and others.

ABSTRACT

Accession Number:
@ 482
U.S. Dept. of Interior, 1973, Final environmental statement for the prototype oil-shale leasing program: v. IV of VI, consultation and coordination with others, Washington, D.C., U.S. Government Printing Office.

Contact: U.S. Government Printing Office (copy)
Area Oil Shale Supervisor's Office (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This is Volume IV of the six-volume, final environmental impact statement for the prototype oil shale leasing program. This volume describes the consultation and coordination with others in the preparation of this final statement, including comments received and the Department's response. Letters received during the review process are reproduced in Volume V (Abstract No. 483), and oral testimony is contained in Volume VI (Abstract No. 484).

ABSTRACT

Accession Number:
@ 483
U.S. Dept. of Interior, 1973, Final environmental statement for the prototype oil-shale leasing program: v. V of VI, letters received during review process, Washington, D.C., U.S. Government Printing Office.

Contact: U.S. Government Printing Office (copy)
Area Oil Shale Supervisor's Office (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This is Volume V of the six-volume, final environmental impact statement for the prototype oil shale leasing program. This volume contains all of the letters received by the Department which commented on the draft environmental impact statement. Written comments were received from 17 federal agencies, one U. S. Congressman, seven state agencies, 27 enviornmental conservation groups, 24 private industrial companies, 123 private citizens, and three miscellaneous groups. Material appended with the written comments, the hearing exhibits, and other public documents are also included.

ABSTRACT

Accession Number:
@ 484
U.S. Dept. of Interior, 1973, Final environmental statement for
the prototype oil-shale leasing program: v. VI of VI, public
hearings held during the review process, Washington, D.C.,
U.S. Government Printing Office.

Contact: U.S. Government Printing Office (copy)
Area Oil Shale Supervisor's Office (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This is Volume VI of the six-volume, final environmental impact statement for the prototype oil shale leasing program. This volume contains the transcripts of the oral comments received during six public hearings held during October 1972 on the draft statement.

ABSTRACT

Accession Number:
@ 484.1
U.S. Dept. of the Interior, unknown date, In-situ oil shale leasing: draft environmental impact statement.

Contact:

Key Categories: IN-SITU, ENVIRONMENTAL, PROCESS WATER USE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

This draft environmental impact statement (EIS) was intended to supplement the Department of Interior's (USDI) final EIS of August 1973. The original EIS focused on developing the federal lease tracts by surface processing methods. This EIS extends that original EIS to consider the development of the federal lease tracts by in-situ methods. The draft EIS was prepared in response to a law suit against the USDI for failure to consider in-situ technology. When the USDI won that suit, the EIS was shelved.

The report is organized in the standard EIS format. It overviews the environmental stipulations of the federal leases, describes current technologies for in-situ retorting, describes the existing environment, including surface water and ground water, discusses environmental impacts and mitigating measures, and presents adverse impacts that cannot be avoided.

ABSTRACT

Accession Number:
@ 485
Iorns, W.V., Hembree, C.H, and Oakland, G.L., 1965, Water resources of the Upper Colorado River Basin--technical report: U.S. Geological Survey Professional Paper 441, 370 p. + plates.

Contact: USGS Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, AVAILABLE WATER BY BASIN, SEDIMENT, PRESENT WATER USE

Access Code: 011 Use Code: 01

This report presents the results of an appraisal of the surface water resources of the Green division Grand division, and San Juan division. The Green division includes the 44,700 square miles of the Green River drainage basin in Colorado, Wyoming, and Utah. Water uses existing in 1957 are reported; and interpretations are made of stream behavior, chemical quality of water, and sediment yield on the basis of the average that would have occurred if the 1957 developments had existed throughout water years 1914-57. The appraisal will be useful in planning future development of surface water supplies and in evaluating changes in streamflow, chemical quality of water, and sediment yield that may result from water-development projects constructed after 1957.

ABSTRACT

Accession Number:
@ 486
Iorns, W.V., Hembree, C.H., Phoenix, D.A., and Oakland, G.L., 1964, Water resources of the Upper Colorado River Basin--basic data: U.S. Geological Survey Professional Paper 442, 1036 p. + plates.

Contact: USGS Library (loan)

Key Categories: COLORADO, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, SEDIMENT, SPRINGS, CLIMATE

Access Code: 011 Use Code: 01

This is the basic data section of a report by the U.S. Geological Survey on the water resources of the Upper Colorado River Basin (Iorns et al., 1965). This section contains tables of duration of water discharge at 176 stream-gaging sites, monthly and annual summaries of chemical quality and sediment data at sites of continuous record, results of chemical quality and sediment analyses at miscellaneous-sampling sites, data on the chemical quality and other characteristics of ground water, and isohyetal maps of normal seasonal and annual precipitation. Also included is an inventory of surface-water records of streamflow, chemical quality, and suspended sediment. Location of gaging stations, chemical-quality and sediment-sampling sites, and wells and springs, are shown on a map of the Upper Colorado River Basin.

ABSTRACT

Accession Number:
@ 487
Iorns, W.V., Hembree, C.H., Phoenix, D.A., and Oakland, G.L., 1959, Basic data on chemical quality of water in the lower Duchesne River drainage basin: U.S. Geological Survey Open-File Report, 64 p.

Contact: Open-File Services Section (copy)

Key Categories: UTAH, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 02

The Water Resources Division of the U.S. Geological Survey is currently conducting a study of the water resources of the Upper Colorado River basin with special emphasis on the water quality.

Available data on the chemical quality of the ground and surface waters of the Lower Duschene River basin and statistical summarizations of these data and related streamflows are presented. Because of the chemical quality of the waters of the area is the result of environmental factors, the geology, streamflow, and other major factors influencing water quality in the area are briefly described.

ABSTRACT

Accession Number:
@ 488
Israelsen, C.E., and others, 1980, Use of saline water in energy development: Utah Water Research Laboratory Rep. UWRL/P-80/04, 128 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: SALINITY, UTAH, PROCESS WATER USE

Access Code: 011 Use Code: 02

Maps were made of the Upper Colorado River Basin showing locations of coal deposits, oil and gas, oil shale, uranium, and tar sand, in relationship to cities and towns in the area. Superimposed on these are locations of wells showing four ranges of water quality; 1,000-3,000 mg/l, 3,000-10,000 mg/l, 10,000-35,000 mg/l, and over 35,000 mg/l. Information was assembled relative to future energy-related projects in the upper basin, and estimates were made of their anticipated water needs.

Using computer models, various options were tested for using saline water for coal-fired power plant cooling. Both cooling towers and brine evaporation ponds were included. Information is presented of several proven water treatment technologies, and comparisons are made of their cost effectiveness when placed in various combinations in the power plant makeup and blowdown water systems. A relative value scale was developed which compares graphically the relative values of waters of different salinities based on three different water treatment options and predetermined upper limits of cooling tower circulating salinities.

Coal from several different mines was slurried in waters of different salinities. Samples were analyzed in the laboratory to determine which constituents had been leached from or absorbed by the coal, and what possible deleterious effects this might have on the burning properties of the coal, or on the water for culinary use or irrigation.

ABSTRACT

Accession Number:
@ 488.1
Israelsen, E.K., and Riley, J.P., 1973, A hybrid computer simulation model for model for precipitation on runoff characteristics: in Distribution of precipitation in mountainous areas, v. II, Proceedings of the Geilo Symposium, Geilo, Norway, July 31 - Aug. 5, 1972, World Meteorological Organization Publication no. 326 (2 vol.), p. 552-564.

Contact: Utah State University Library (loan)

Key Categories: UTAH, COMPUTER MODELS, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

A distributed parameter hydrologic model based on fundamental relationships, several of which are non-linear, was described. Spatial resolution was achieved by subdividing the modeled area and by applying average values of model parameters within each subzone. Input data for each subzone consisted of precipitation, temperature, and physical characteristics. To demonstrate its ability to predict the effects of aerial distribution of precipitation on runoff characteristics, the model was applied to a watershed within the Wasatch Mountains of Northern Utah. Telemetered precipitation stations are distributed throughout the area. The computer model predicted actual runoff patterns and simulated runoff patterns under assumed patterns of precipitation distribution.

ABSTRACT

Accession Number:
@ 489
Jackson, L.P., Poulson, R.E., Spedding, T.J., Phillips, T.E., and Jensen, H.B., 1975, Characteristics and possible roles of various waters significant to in situ oil shale processing: Quarterly of the Colorado School of Mines, v. 70, no. 4, p. 105-134.

Contact: Colorado School of Mines (copy)

Key Categories: EFFLUENTS, IN-SITU, LEACHING

Access Code: 011 Use Code: 02

An in situ oil shale development program requires consideration of water produced with oil in retorting oil shale and of natural waters significant to oil shale processing. These waters may be heavily laden with organic, inorganic, or both types of constituents and must be considered for feasibility of use, storage or disposal in environmentally acceptable ways. Analyses of such waters are presented. Compositions are shown for a variety of simulated in situ retort-produced waters. Compositions of natural underground waters occurring in potential in situ development areas in the Upper Green River Basin of southwestern Wyoming are presented. Retort-produced waters contain as much as 2 percent organic and 5 percent inorganic constituents and may be produced in volumes in excess of that of the oil. Natural waters of significance may contain over 5 percent inorganic and 5 percent organic components.

ABSTRACT

Accession Number:
@ 490
Jackson, L.P., and Wright, C.C., eds., 1980, Analysis of waters associated with alternative fuels production: a symposium sponsored by ASTM committee D-19 on water, ASTM Special Technical Publication 720, 206 p.

Contact: ASTM (copy)

Key Categories: PROCEEDINGS, EFFLUENTS, SURFACE, IN-SITU, LEACHING

Access Code: 011 Use Code: 01

This symposium proceedings presents 16 papers which address characteristics of waters from emerging energy technologies; parametric analysis of inorganic and organic species and biological activity; and characteristics of waters that are in contact with solid fossil energy wastes. Some of the more relevant papers for this water resources study are abstracted elsewhere in this bibliography as follows: Analysis of TOSCO II Oil Shale Retort Water (Abstract No. 426); Water Analysis for Baseline Characterization and Process Development of a Multimineral Oil Shale Process (Abstract No. 583); Elemental Composition of Simulated In Situ Retort Water (Abstract No. 370); Paraho Waters - Characteristics and Analysis of Major Constituents (Abstract No. 865).

ABSTRACT

Accession Number:
@ 491
Jacobs, H.R., March 1979, BX in situ oil shale project, annual technical progress report FE-78LC10747-2 for March 1, 1978 - Feb. 28, 1979 and quarterly technical progress report for Dec. 1, 1978 - Feb 28, 1979: Equity Oil Co., Salt Lake City, Utah, U.S. DOE Rep. SAN-1747-T1, 169 p.

Contact: U.S. Government Printing Office (copy)

Key Categories: COLORADO, CLIMATE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 02

This is an annual and quarterly progress report for the Equity BX in-situ oil shale project. The appendices to this report present environmental data. Appendix C summarizes environmental monitoring at the site for Dec. 1978-Feb. 1978. The air quality section tabulates information on wind direction and speed occurrences and relative frequency distributions and monthly and daily temperatures, and it presents a wind rose. Appendix E presents an annual summary report for on-site environmental monitoring. This report shows locations of monitoring sites and lists the parameters measured at them.

ABSTRACT

Accession Number:
@ 492
Jacoby, G.C., Jr., 1975, An overview of the effect of Lake Powell on Colorado River basin water supply and environment: Lake Powell Research Project Bulletin No. 14.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN

Access Code: 182 Use Code: 03

In this Bulletin, the author briefly examines the interrelationship of Lake Powell with the Upper and Lower Colorado River basins in terms of water storage, present and future water supply and consumption.

ABSTRACT

Accession Number:
@ 492.1
Jacoby, G.C., Weatherford, G.C., and Wegner, J.W., Oct. 1976, Law, hydrology, and surface water supply in the Upper Colorado River basin: American Water Resources Association, Water Resources Bulletin, v. 12, no. 5, p. 973-984.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, WATER LAW, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 03

The relationship between law and hydrology in water resources development is discussed. Law attempts to allocate a limited and valuable resource while hydrology tries to define the limits of the resource. In the past an inadequate data base has made hydrologic estimates difficult and political factors pushed the law into possibly conflicting commitments in the Colorado River basin. The water allocation process and the role of hydrology in defining the risk of deficiency are described and a historical overview of the interaction between law and hydrology is presented. Using tree-ring research, hydrologists have produced a more definite data base and thus given legal policy makers more reliable information. As development approaches the resource limit in the upper Colorado River basin, lawyers and hydrologists must act in concert toward the equitable solution of allocation and reallocation problems.

ABSTRACT

Accession Number:
@ 493
James, L.D., Larson, D.T., Hoggan, D.H., and Glover, T.L., 1980,
Flood damage mitigation in Utah: Utah Water Research Laboratory
Report UWRL/P-80/01, 106 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: FLOODS, UTAH

Access Code: 011 Use Code: 01

Utah is subjected to flash flooding in mountain canyons, mudflows and shallow water flooding on lowlands at the canyon outlets, storm water flooding after thunderstorms in urban areas, and prolonged periods of inundation in certain lowland areas during snowmelt periods. In response to these problems, individuals are making private land use and flood proofing decisions, larger communities have storm water collection programs, three federal agencies are involved in structural flood control, and the Federal Emergency Management Agency is managing a National Flood Insurance Program designed to promote community floodplain management efforts.

A framework was developed of the dynamically interactive feedback process through which people at various levels and from various prospectives seek the benefits of floodplain occupancy, experience floods, and respond by changing their occupancy or the flows. That framework then became the background for identifying what state government should do in Utah to correct unsatisfactory aspects of the existing flood hazard and counter measures.

The data used in the analysis included magnitudes of major historical snowfall and precipitation events, estimates of 100-year flows for all 105 gaged locations with more than 20 years of record, envelope curves of 100-year flow versus drainage area for Utah basins, descriptions of the major historical floods, descriptions of the structural flood control projects built or being planned in Utah by the Corps of Engineers, Soil Conservation Service, and Water and Power Resources Service, data with respect to participation in the national flood insurance program of Utah's 251 communities, a survey of the flood hazard in 32 of those communities randomly selected from a stratified sample, and a detailed evaluation of the situations in 7 of them.

ABSTRACT

Accession Number:
@ 493.1
Jarrett, R.D., 1981, Flood hydrology of foothill streams in Colorado: in Water-resources investigations of the U.S. Geological Survey in Colorado - fiscal year 1981, U.S. Geological Survey Open-File Report 81-150, p. 23

Contact: Bob Jarrett (status)

Key Categories: COLORADO, FLOODS

Access Code: 011 Use Code: 01

The purpose of this study is to develop methods for determining flood frequencies from records of mixed-population floods and for estimating flood characteristics at ungaged sites on streams where mixed-population floods occur.

A literature search and review was completed. Studies using geomorphic and botanic data and channel-geometry data to develop techniques for estimating flood characteristics at ungaged sites are in progress. Twenty crest-stage gages have been installed and data are being collected. Methods are being developed for identifying and analyzing mixed-population floods. Records from an additional 30 gaging stations were used to separate snowmelt from rainfall floods, bringing the total number of separations to 60. A preliminary statistical analysis of mixed-population flood records indicates that rainfall-produced floods are less prevalent at higher elevations than expected. A paper on debris flows has been submitted to the Association of Engineering Geologists for publication in their bulletin. A project-planning report was distributed to the cooperators and others interested in the study.

ABSTRACT

Accession Number:
@ 493.2
Jenkins, C.T., March -April 1968, Techniques for computing rate and volume of stream depletion by wells: Groundwater, v. 6, no. 2, p. 37-46.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, GROUNDWATER QUANTITY, SURFACE WATER QUANTITY, COMPUTER MODELS

Access Code: 002 Use Code: 01

The effects of flow of a nearby stream from pumping a well can be calculated readily using dimensionless curves and tables. Computations can be made of: (1) the rate of stream depletion at any time during the pumping period or after the cessation of pumping; (2) the volume induces from the stream at any time, both during pumping or after the cessation of pumping; and (3) the effects, both in rate and volume of stream depletion, of any selected pattern of intermittent pumping. The paper includes definitions, 4 solved problems, and 5 curves for solving field problems.

ABSTRACT

Accession Number:
@ 494
Jeppson, R.W., and others, 1968, Hydrologic atlas of Utah.

Contact: none

Key Categories: CLIMATE, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, UTAH

Access Code: 002 Use Code: 02

This publication presents a summary of the climate and ground and surface water resources of Utah. The section on climate includes temporal and spatial variations in temperature and precipitation, freezing temperatures, growing degree days, and potential evapotranspiration. The surface water section includes stream flow patterns, mean annual and seasonal runoff, extrapolation of stream flow measurements to ungaged areas, frequency distributions of runoff, flow duration analyses, annual high and low flow analyses, long-term flow characteristics, and flood frequency analyses. The ground water section summarizes general ground water conditions, the history of development, ground water occurrence, and a summary of ground water conditions by geographic area. A separate water quality section characterizes water quality in ground and surface waters by geographic area.

ABSTRACT

Accession Number:
@ 495
Johnson, R.W., 1975, Legal and institutional problems in the management of salinity: Washington University School of Law, Seattle, Washington, Project OWRT A-076-WASH (1).

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, WATER LAW

Access Code: 002 Use Code: 02

This study examines the Colorado River basin salinity management program. The optimal soultion will generally be found by considering the problem on a basinwide basis. In most cases the optimal solution is one that would result in the least total cost per unit for the largest salinity reduction. This optimal solution requires extensive voluntary cooperation among all water uses; it has proven quite effective in the Colorado River basin. The recommendations for a comprehensive basinwide or regional management entity to plan an implement a salinity control program for the Colorado River basin have, to date, produced a voluntary, cooperative interstate discussion group, the "Colorado River Basin Salinity Control Forum." To date all irrigation efficiency and water use management programs have been voluntary and are based on education and persuasion rather than on legal regulation. Most water managers and other experts in the Colorado River basin believe the voluntary program will, in the long run, be more effective.

ABSTRACT

Accession Number:
@ 495.1
Johnston, R.S., and Doty, R.D., July 1972, Description and hydrologic analysis of two small watersheds in Utah's Wasatch Mountains: Intermountain Forest and Range Experiment Station, USDA Forest Service Res. Paper INT-127, 53 p.

Contact: NTIS (copy)

Key Categories: UTAH, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, CLIMATE

Access Code: 002

Use Code: 03

The climate, geology, soils, and vegetation are included in a description of two small watersheds characteristic of the high-elevation Aspen type of Northern Utah. Precipitation, soil-water use, evapotranspiration, and quantity and quality of streamflow on these relatively undisturbed catchments are graphically illustrated and discussed. These data permit pretreatment calibration of these watersheds. This thorough inventory will allow a sensitive, multi-resource analysis of planned treatments designed to increase water yields.

ABSTRACT

Accession Number:
@ 495.2
Johnston, R.S., Tew, R.K., Doty, R.D., 1969, Soil moisture depletion and estimated evapotranspiration on Utah Mountain Watershed: USDA Forest Service Res. Paper INT-67, 13 p.

Contact: NTIS (copy)

Key Categories: UTAH, SURFACE WATER QUANTITY, CLIMATE

Access Code: 002 Use Code: 02

Soil moisture depletion was measured with a neutron moisture probe on 14 sites representing 10 vegetation types on mountain watershed in Utah. A water balance equation was used to estimate evapotranspiration (ET). Both soil moisture depletion and ET varied considerably between sites and from year to year. Aspen (populus tremuloides) sprouts utilized from 0.48 to 4.50 in. less water from 6 ft. of soul than mature Aspen; gimbel oak (auercus gambelii) sprouts utilized from 0.25 to 1.15 in. less water than mature oak. By converting aspen to grass, ET losses were reduced from 1.08 to 5.18 in. from the surface 6 ft. of soil and up to 7.59 in. from a 9-ft. soil depth.

ABSTRACT

Accession Number:
@ 495.3
Julian, R.W., Yevjevich, V., and Morel-Seytoux, H.J., Aug. 1967,
Prediction of water yield in high mountain watersheds based on
physiography: hydrology papers, Colorado State University, Fort
Collins, Colorado, 20 p.

Contact: Engineering Research Center (copy)

Key Categories: COLORADO, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

A statistical method is presented that permits the estimation of yield of high mountain watersheds in terms of physiographic characteristics evaluated from maps.

The method is advantageous because it does not require the knowledge of the climatic or hydrologic characteristics of the basin or of the region. The methods, is however, limited to regions of reasonable climatic and hydrologic homogeneity.

The applicability of the method is illustrated for several regions in the Upper Colorado River Basin. A coefficient of determination as high as 77 percent is obtained in the best case. In the worst result the coefficient falls below 50 percent.

The estimate of specific yield is valuable for many applications. It provides, in particular, a means of deciding upon the suitability of basins to weather modification programs.

ABSTRACT

Accession Number:
@ 495.4
Jurado, A., and Fields, F.K., 1978, Channel migration of the White River in the eastern Uinta Basin, Utah and Colorado: U.S. Geological Survey Miscellaneous Investigations Map I-1087.

Contact: Public Inquiries Office (copy)

Key Categories: UTAH, COLORADO, SURFACE WATER QUANTITY, FLOODS

Access Code: 011 Use Code: 01

The White River is the largest stream in the southeastern part of the Uinta Basin in Utah and Colorado. This map shows the changes that have occurred in the location of the main channel of the river from 1936 to 1974. The map indicates that certain reaches of the river are subject to different rates of channel migration. Also shown is the boundary of the flood plain, which is mapped at the point of abrupt break in slope. This map documents the position of the river channel prior to any withdrawals of water or alteration of the flow characteristics of the White River that may occur in order to meet water requirements principally associated with the proposed oil-shale industry or other development in the area.

The channel locations were determined from aerial photographs taken at four different time periods for the following Federal agencies: 1936, U.S. Soil Conservation Service; 1953, U.S. Corps of Engineers; 1965, U.S. Geological Survey; and 1974, U.S. Bureau of Land Management. The 1936 delineation, which is actually based upon photographs that were taken in 1936 and 1937, was made by projection of the original photographs on a base map that was prepared from 1:24,000 scale topographic maps. The 1953, 1965, and 1974 delineations were produced from stereographic models. The 1965 delineation was compiled from photographs that were taken during 1962–65. The delineation is labeled as 1965 for simplicity, however, because the photographs for 1965 cover about 60 percent of the study reach of the river, and because no changes were discernible in those areas of repetitive photographic coverage.

ABSTRACT

Accession Number:
@ 496
Kaman Tempo, Nov. 1981, Infiltration and permeability testing at Geokinetics oil shale site: draft report submitted by Kaman Tempo, Santa Barbara, CA to U.S. EPA, 60 p.

Contact: Ed Bates (copy)

Key Categories: IN-SITU, ENVIRONMENTAL

Access Code: 011 Use Code: 02

Infiltration and pressure permeability (packer) tests were conducted in or near in-situ retort areas and in undisturbed areas to obtain comparative data to evaluate the potential for increased ground water pollution due to this type of retorting activity.

These tests indicated a slight increase in surface infiltration and rock permeability in or near the retort areas. Due to the depth of the shallowest aquifer underlying the test sites (roughly 800 to 900 feet) and the intervening rock being highly impermeable shale, marlstone, oil shale and tar sand, it is expected that the in-situ retorting activities will pose no threat to ground water resources.

ABSTRACT

Accession Number:
@ 496.1
Kauffman, K., 1977, Water -- demand and supply: economics impacts: in Conference proceedings - a critical economic balance - water - land - energy - people, June 6-7, Colorado State University, Pingree Park Campus, p. 32-38.

Contact: Colorado State University Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 002 Use Code: 03

The role of water in national economic development is discussed, with special attention to energy and to the Federal government's water policy. The discussion focuses on Western states of the Federal Energy Administration's Region VIII. In the upper and lower Colorado River basin water will probably limit energy development, but not in the upper Missouri River basin. Average annual water supply in the upper Colorado basin is about 5.8 million acre-feet, of which 3.7 million is actually consumed, leaving only 2.1 million for additional development. Estimated water demand for the year 2000 is over 2.5 million acre-feet of additional water, for energy, municipal and industrial use, agriculture, fish and wildlife, and recreation. The upper Missouri basin has an annual flow of 28 million acre-feet, of which only six million is used. The era of major federally funded water development in the United States is ending; Federal water planning will now focus on national economic development, environmental quality and water conservation. Regional development has ceased to be sanctioned as a national water resources policy objective. At the National Water Conference, Secretary of the Interior Andrus indicated that nonstructural water planning and management measures will have equal status with structural ones, non-federal entities will be required to bear a larger share of project costs, and water allocation practices will be reviewed and revised.

ABSTRACT

Accession Number:
@ 496.2
Keefer, T.N., and McQuivery, R.S., May 1979, Water availability for development of major tar sands areas in Utah: Report prepared by Sutron Corp. under contract to Colorado State University, Rep. LETC-0013-1, 228 p.

Contact: Dick Poulson (copy)
NTIS (copy)

Key Categories: UTAH, AVAILABLE WATER BY BASIN, WATER LAW, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SPRINGS

Access Code: 011 Use Code: 02

This study, which was a fact-finding effort, involved the compilation and interpretation of water resources information from publications of the U.S. Geological Survey, the Utah State Engineer, and other agencies. Although the report is focused on water availability for tar sands development, the information is directly applicable to water availability for oil shale development, since the deposits occur in proximate areas.

The study addresses water availability for future tar sands extraction in six major deposits in Utah: (1) Asphalt Ridge and Whiterocks, which are west of Vernal; (2) P.R. Spring, an area extending from the Colorado River to the White River along Utah's eastern boundary; (3) Hill Creek, adjacent to P.R. Spring to the west; (4) Sunnyside, immediately across the Green River from Hill Creek between the Price and Green Rivers; and (5) Tar Sand Triangle, near the confluence of the Colorado and Dirty Devil Rivers. This report covers the general physiographic and geologic features of the total area, the estimated water requirements for tar sands development, the availability of water in each of the six areas, and the legal and sociological restraints and impacts. Conclusions regarding water availability for tar sands development in each area and specific recommendations related to the development of each are presented also.

ABSTRACT

Accession Number:
@ 497
Keith, J.E., and others, 1973, Interregional planning of water resources allocations by systems analysis approach - a summary report: Utah Water Research Laboratory, 41 p.

Contact: Utah State University Library (loan)

Key Categories: UTAH, COMPUTER MODELS

Access Code: 182 Use Code: 02

The general objective of the study was to develop the methodoloy for determining optimal allocations of water in Utah, given alternative assumptions and constraints. The approach was to structure a statewide model of water use and delivery in a linear programming framework, explicitly including the water supply system, various demands for water, and aternative water salvage, reuse, and transfers under consideration by water planners. The optimal solutions to the statewide programming model were based upon maximizing net economic returns to water use in the state given alternative assumptions and were, therefore, the economically efficient allocations of Utah's water supplies.

ABSTRACT

Accession Number:
@ 498
Keith, John E., Anderson, J.C., and Clyde, C.G., 1973, The economic efficiency of inter-basin agricultural water transfers in Utah - a mathematical programming approach: Utah Water Research Laboratory, 136 p.

Contact: Utah State University Library (loan)

Key Categories: UTAH, COMPUTER MODELS

Access Code: 182 Use Code: 03

The economic efficiency of water development in Utah, including transfer systems, has seldom been examined, nor has the costs of public policies which result in deviations from efficient allocations. In order that public officials be better informed about water allocations, the present effort examines the efficient allocation of water in time frames up to 2020 under several alternative assumptions and calculates the cost of alternative policies.

Using mathematical programming techniques, a computer model is developed to determine the supply (marginal cost) and demand (value of marginal product) relationships for agricultural water, given depletions for municipal and industrial (M&I) and wetland requirements. The model maximizes net profit per acre to an average agriculturalist in each of ten study areas in Utah. Proposed interbasin transfers and their costs are included in supply. The optimal solution generated is an efficient allocation, since maximization of net profits occurs only when value of marginal product equals marginal cost.

ABSTRACT

Accession Number:
@ 500
Keith, J.E., Turna, K.S., Padunchai, S., and Narayanan, R., 1978, The impact of energy development on water resource allocations: Utah Water Research Laboratory Rep. UWRL/P-78-05, 95 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: UTAH, AVAILABLE WATER BY BASIN, PRESENT WATER USE, PROCESS WATER USE, COMPUTER MODELS

Access Code: 011 Use Code: 01

This research used a linear programming model of the agricultural and energy sectors of Utah to examine the economically efficient allocation of water between agriculture and energy. Data were collected for agricultural returns, costs, and water requirements; energy returns, costs, and water requirements; and water supply costs. Results indicate that if large scale energy development occurs in the Colorado River Basin in Utah, most of irrigated agriculture will be eliminated, given Utah's consumptive use constraint under the Upper Colorado River Compact. On the other hand, for two more "probable" levels of energy development, including the Energy Research and Development Administration's projections for the year 2000, only minor reductions in irrigated acreages would be expected. Under conditions of severe, prolonged drought, energy demands would consume almost all the water currently used in agriculture, given either of the "probable" scenarios.

ABSTRACT

Accession Number:
@ 500.1
Kelly, K.E., 1982, Bailing and construction considerations for deep aquifer monitoring wells on western oil shale leases: Ground Water, v. 20, no. 2, p. 179-185.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, GROUNDWATER QUALITY

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 501
Kerr, R.D., and McTernan, W.F., July 1975, Completion report--an environmental reconnaissance study for Sweetwater County in situ oil shale research: prepared by Wyoming Water Resources Research Institute, for Laramie Energy Research Center

Contact: Dick Poulson (loan)

Key Categories: SURFACE WATER QUALITY, WYOMING, WATER LAW

Access Code: 002 Use Code: 03

This report presents environmental baseline data and summarizes regulatory requirements for in situ oil shale developments in Sweetwater County, Wyoming. It reviews land use, water resources, air resources, biology, reclamation, and other environmental components, discusses regulatory requirements for each of these areas, and presents some physical and chemical measurements on Bitter Creek and Killpecker Creek made in May of 1975.

ABSTRACT

Accession Number:
@ 502
Kilburn, P.D., Atwood, M.T., and Broman, W.M., 1974, Oil shale development in Colorado - processing technology and environmental impact: Denver, Colony Development Operation, Atlantic Richfield Company.

Contact: P. Fox (access)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 503
Kildebeck, J.C., Paananen, O.H., and Birch, J.W., 1967, Projected gross residential water requirements in the Green and Platte River basins of Wyoming - 1965-2010: Wyoming Water Resources Research Insititute Water Resources Series No. 5.

Contact: University of Wyoming Library (loan)

Key Categories: WYOMING, PRESENT WATER USE

Access Code: 002 Use Code: 02

The purpose of this report is to provide estimates of long-term residential water requirements for the Platte and Green River Basins of Wyoming. Estimates of residential water use are shown by five-year intervals for counties and for the entire basin areas--specified in gallons per capita per day, thousands of gallons per day, and millions of gallons per year. The estimates are preliminary in the sense that additional research now underway may provide additional evidence that will serve to modify the initial estimates shown here.

The projections are derived from mathematical estimating equations in which temperature, water cost, and time are used as variables for estimation of per capita water consumption. Water consumption data were obtained from a survey of six communities in the Platte River Basin (comprising about two-thirds of the basin population), and from Rock Springs and Green River in the Green River Basin. Population estimates presented in Population Trends for the Platte and Green River Basins in Wyoming: 1890-2010, Water Resource Series Number 4, provided the basis for obtaining total residential water requirements for the forecast period.

ABSTRACT

Accession Number:
@ 504
Kilkelly, M.K., Harbert, H.P. III, and Berg, W.A., 1981, Revegetation studies on TOSCO II and USBM retorted oil shales: in Proceedings of the 14th Oil Shale Symposium, Golden, Colorado, Colorado School of Mines Press, p. 410-421.

Contact: Colorado School of Mines (copy)

Key Categories: LEACHING, RECLAMATION, SURFACE

Access Code: 011 Use Code: 01

In 1973 studies on the revegetation of processed oil shales were initiated by the Department of Agronomy of Colorado State University with funding from the Environmental Protection Agency. The objectives of these studies were to investigate the vegetative stabilization of processed oil shales and to follow moisture and soluble salt movement in the retorted shale profile.

Studies involving TOSCO II and USBM retorted shales were established at both a low-elevation (Anvil Points) and a high-elevation (Piceance Basin). Treatments included leaching and various depths of soil cover. Vegetation was established with intensive treatment and management. Measurements reported include vegetative cover and species composition, soil moisture, and soluble salts in the retorted shale profile, surface runoff, and surface temperatures.

ABSTRACT

Accession Number:
@ 505
Kilkelly, M.K., Harbert, H.P., III, and Berg, W.A., June 1981, Field studies on Paraho retorted oil shale lysimeters: leachate, vegetation, moisture, salinity, and runoff, 1977-1980: Rep. EPA 600/7-81-131, 86 p.

Contact: Ed Bates (copy)

Key Categories: LEACHING, RECLAMATION, SURFACE

Access Code: 011 Use Code: 01

A disposal scheme for Paraho retorted shale utilizing lysimeters to simulate a low-elevation (dry site) and a high-elevation (moist site) was constructed. Objectives of the study were to investigate 1) vegetative stabilization of Paraho retorted shale, as affected by leaching and soil cover treatments; and 2) moisture and soluble salt movement through the soil/shale profile.

After intensive management and four growing seasons, only a sparse (2% to 3%) cover of perennial vegetation resulted on the Paraho retorted shale. In contrast, good to excellent cover was established and maintained on the soil control and soil-covered retorted shale treatments.

Initial leaching and irrigation for plant establishment produced percolate from drains below the compacted shale zone. The percolate from the Paraho retorted shale treatment measured a maximum electrical conductivity (EC) of 35 mmhos/cm and pH of 11.4. The soil control produced percolate with a maximum EC of 8.5 mmhos/cm and a pH of 8.3. Each spring the high-elevation lysimeter received supplemental irrigation to simulate a zone of higher precipitation. Percolate produced from these irrigations exhibited a general overall reduction in both EC (33 to 11.4 mmhos/cm) and pH (11.4 to 8.6) by 1980 on the Paraho retorted shale treatment. The low-elevation lysimeters did not receive additional spring irrigations and no percolate was produced from the unleached treatments.

ABSTRACT

Accession Number:
@ 506
Kilkelly, M.K., and Berg, W.A., Harbert, H.P., III, 1981, Field studies on USBM and TOSCO II retorted oil shales: vegetation, moisture, salinity, and runoff, 1977-1980: Rep. EPA 600/7-81-139, 105 p.

Contact: Ed Bates (copy)

Key Categories: LEACHING, RECLAMATION, SURFACE

Access Code: 011 Use Code: 01

Field studies were initiated in 1973 to investigate the vegetative stabilization of processed oil shales and to follow moisture and soluble salt movement within the soil/shale profile. Research plots with two types of retorted shales (TOSCO II and USBM) with leaching and soil cover treatments were established at two locations: low-elevation (Anvil Points) and high-elevation (Piceance Basin) in western Colorado. Vegetation was established by intensive management including leaching, N and P fertilization, seeding, mulching, and irrigation.

After seven growing seasons, a good vegetative cover remained with few differences between treatments, with the exception of the TOSCO retorted shale, south-aspect, which consistently supported less perennial vegetative cover than other treatments. With time, a shift from perennial grasses to dominance by shrubs was observed. Rodent activity on some treatments had a significantly negative effect on vegetative cover.

After initial irrigation for establishment, the vegetation was dependent on seasonal precipitation. Spring snowmelt resulted in recharge of profiles to depths of 60 to 120 cm. By fall, plant-available moisture was depleted by evapotranspiration. Although the fine-textured TOSCO retorted shale usually produced the greatest runoff of all treatments, the surface runoff and sediment yields were generally low due to the adequate vegetative cover. Initially, some accumulation of soluble salts occurred at the surface because of ineffective leaching. With subsequent weathering, salinity decreases throughout the entire profile of most treatments were observed. Recorded surface temperatures of the black TOSCO retorted shale were sufficiently high to limit seedling establishment and increase surface evaporation.

This report follows an initial report by Harbert and Berg (1978) which detailed the construction, establishment techniques, and interpretation of measurements from 1973 to 1976.

ABSTRACT

Accession Number:
@ 506.1
Kilpatrick, F.A., Aug. 1977, Energy development scenarios and water demands and surplus -- an overview: U.S. Geological Survey Open-File Report 77-697, 14 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN, PROCESS WATER USE, SURFACE

Access Code: 002 Use Code: 02

On the basis of average mean annual flows, ample water exists in the upper Missouri River basin for energy development. The lack of storage and diversion works upstream as well as state compacts preclude the ready use of this surplus water. These surplus flows are impounded in mainstream reservoirs on the Missouri downstream from coal mining areas but could be transported back at some expense for use in Wyoming and North Dakota. There are limited water supplies available for the development of coal and oil shale industries in the upper Colorado River basin. Fortunately oil shale mining, retorting and reclamation do not require as much water as coal conversion; in situ oil shale retorting would seem to be particularly desirable in the light of reduced water consumption. Existing patterns of energy production, transport, and conversion suggest that more of the coal to be mined out West is apt to be transmitted to existing load centers rather than converted to electricity or gas in the water-short West. Scenarios of development of the West's fossil fuels may be overestimating the need for water since they have assumed that major conversion industries would develop in the West. Transport of coal to existing users will require all means of coal movement including unit trains, barges, and coal slurry pipelines. The latter is considered more desirable than the development of conversion industries in the West when overall water consumption is considered.

ABSTRACT

Accession Number:
@ 507
Kimball, B.A., 1981, Geochemistry of spring water, southeastern Uinta basin, Utah and Colorado: U.S. Geological Survey Water-Supply Paper 2074, 30 p.

Contact: Public Inquiries Office (copy)

Key Categories: COLORADO, UTAH, SPRINGS, GROUNDWATER QUALITY, COMPUTER MODELS

Access Code: 011 Use Code: 01

The chemical quality of water in the southeastern Uinta basin, Utah and Colorado, is important to the future development of the abundant oil-shale resources of the area. The report examines the observed changes in chemistry as water circulates in both shallow and deep-ground water systems. Mass-balance and mass-transfer calculations are used to define reactions that simulate the observed water chemistry in the mixed sandstone, siltstone, abd carbonate lithology of the Green River formation of Tertiary age.

Spring water in the southeastern Uinta basin discharges from local shallow circulation, intermediate circulation, and regional deep circulation. The chemical character of spring water changes from calcium bicarbonate type during shallow circulation to a calcium magnesium bicarbonate sulfate type during deep circulation.

A chemical mass-transfer model was used to follow changes in water chemistry. The sequence of chemical events which produce this chemical character includes saturation of the aqueous solution with kaolinite at an early stage of reaction progress, then saturation with calcite and Ca-montmorillonite. The concentrations of aqueous species are controlled by these mineral equilibria; however in the case of silica, it was not possible to determine an exact controlling reaction.

ABSTRACT

Accession Number:
@ 507.1
Kimsey, R.A., 1975, Water allocation in Utah-protection of instream uses: Utah Law Review, v. 1975, p. 687-707.

Contact: University of Utah Library (loan)

Key Categories: UTAH, WATER LAW

Access Code: 002 Use Code: 03

In Utah, water goes to the most economically profitable user when it does change hands. This emphasis on market value has in the past left instream users empty-handed because their utility in dollar terms was and still is low. This conflict between water for public benefit and water for private economic development is slowly evolving into a balance between the two. The author sees needed legislative changes taking place, but believes they are inadequate in themselves. The judiciary must ensure an equal voice for instream water uses. This can be done most effectively through the public trust doctrine. All competing values could then be considered, not solely the market value of appropriated waterlands.

ABSTRACT

Accession Number:
@ 508
Kinney, W.L., and others, March 1979, Surface water quality parameters for monitoring oil shale development: Las Vegas, Environmental Monitoring and Support Lab, U.S. Environmental Protection Agency, Rep. PB-297984, 156 p.

Contact: NTIS (copy)

Key Categories: SURFACE WATER QUALITY, ENVIRONMENTAL, COLORADO, UTAH

Access Code: 002 Use Code: 02

This report develops and recommends prioritized listings of chemical, physical, and biological parameters which can be used to assess the environmental impact of oil shale development on surface water resources. Each of the potential water-related problems is addressed in the context of the probable cumulative regional impact of a maturing commercial oil shale industry and in terms of local impact resulting from the prototype operation initially planned on leased public lands. The possible effects of potential pollutants on ambient water quality and the resulting impact on aquatic life, public water supplies, livestock, irrigation agriculture, and selected industries are evaluated.

ABSTRACT

Accession Number:
@ 508.1
Kircher, J.E., 1981, Sediment yield of streams, Piceance Creek and Yellow Creek drainage basins: in Water-resources investigations of the U.S. Geological Survey in Colorado - fiscal year 1981, U.S. Geological Survey Open-File Report 81-150, p. 97.

Contact: Jim Kircher (status)

Key Categories: COLORADO, SEDIMENT

Access Code: 011 Use Code: 01

The purposes of this program are to determine the present sediment load of streams draining oil shale and to determine the erosion potential of lands that will be mined.

The monitoring of suspended and total sediment load is in progress at 20 gaging stations. Fifty-two channel cross sections and thirty-five hillslope-erosion transects have been surveyed periodically. Monitoring of sediment movement on hillslopes, into reservoirs and stream channels, and suspended in streamflow also is in progress.

In the future, monitoring will continue. Artificial streamflow controls will be built at two sites and controls modified at two other sites. An interpretive report will be completed.

ABSTRACT

Accession Number:
@ 509
Kleinman, A.P., and Brown, F.B., 1980, Colorado River salinity economic impacts on agricultural, municipal, and industrial users: Water and Power Resources Service.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, PRESENT WATER USE, SALINITY

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 510
Kleinman, A.P., Barney, G.J., and Titmus, S.G., Feb. 1974, Economic impacts of changes in salinity levels of the Colorado River: Denver, Colorado, U.S. Dept. of the Interior, Bureau of Reclamation, 41 p.

Contact: NTIS (copy)

Key Categories: SALINITY, COLORADO, UTAH, WYOMING

Access Code: 011 Use Code: 02

This report quantifies the cost of increased salinity to agriculture, municipalities, and industrial users. It also briefly discusses the physical effects of salinity for each of these three water uses and discusses alternative mitigation measures available to each class of user.

ABSTRACT

Accession Number:
@ 510.1
Klieve, J.R., and Rawlings, G.D., 1981, Assessment of oil shale retort wastewater treatment and control technology: Phases I and II, Rep. EPA-600/7-81-081, 93 p.

Contact: NTIS (copy)

Key Categories: IN-SITU, SURFACE, EFFLUENTS

Access Code: 011 Use Code: 02

Described is a study conducted at the Univ. of Pittsburg to evaluate possible adverse environmental effects from the use of synthetic fuel technology. The environmental effects of operating six unit size synthetic fuel plants were compared with the environmental effects of operating a conventional 3000 Mw coal-burning power plant. Feedstocks to the synthetic fuel plants were coal, oil shale, tar sands, biomass, and municipal wastes. Particulates, sulfur dioxide, and nitrogen oxides in air, and increased salinity and polycyclic aromatic hydrocarbons in water were measured. Air and water pollution resulting from coal-fired power plant operation was much more severe than pollution from the synthetic fuel plant operations. The synthetic conversion processes for the production of liquid and gaseous fuels will not significantly degrade the quality of the environment.

ABSTRACT

Accession Number:
@ 510.2
Klinzing, G.E., Chiang, S.H., and Cobb, J.T., 1979, Environmental effect of synthetic fuel production: Energy Communications, v. 5, no. 5, p. 279-302.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 510.3
Kneese, A.V., and Brown, F.L., 1975, Water demands for energy development: Natural Resources Lawyer, v. 8, no. 2, p. 309-33.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 03

The continued use of water in energy development presents important questions concerning the impact on water supplies and aquatic ecological systems. The consumptive use of water for energy extraction and conversion processes reduces the amount of water available for other uses and may lead to "absolute scarcity", a situation in which there is a lesser physical amount of water available than would otherwise be consumed. Absolute scarcity is not a problem for the nation as a whole, but it does present problems in some arid regions, especially the upper Missouri and upper Colorado River basins. The Colorado is a highly developed, already overworked river which now faces the prospect of a crushing absolute scarcity of water. In comparison, the Yellowstone-Upper Missouri is a relatively primitive situation where the water energy issues are primarily environmental, qualitative rather than quantitative. Other factors discussed that affect the amount of water used in energy development include: (1) scale of development; (2) location of processing facilities; (3) energy development options; (4) specific technology designs for particular options; (5) degree of reclamation of mined land achievable; and (6) public policy.

ABSTRACT

Accession Number:
@ 510.4
Knutson, C.F., Jan. 1975, Project Rio Blanco: summary of related hydrology program to Sept. 1974: CER Geonuclear Corp., Las Vegas, Nevada, 77 p.

Contact: NTIS (copy)

Key Categories: COLORADO, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SPRINGS

Access Code: 002 Use Code: 01

Three nuclear explosives were detonated on May 17, 1973 along Fawn Creek within the Fort Union and Mesaverde formations at depths of between 5,800 and 6,700 feet (Project Rio Blanco). This report summarizes the results of hydrologic testing through September 1974 in the vicinity of this blast.

This report summarizes the results of a six element program consisting of: (1) alluvium aquifer testing and water analyses; (2) "A"-zone aquifer testing and water analyses; (3) "B"-zone aquifer testing and water analyses; (4) Mahogany zone aquiclude testing; (5) detonation-related behavior of wells within 10 miles of blast; and (6) flow rate measurements on springs within 12 miles of blast.

The report tabulates water quality data for each well for pH, TDS, Na, Ca, Mg, Cl, SO_4, $CaCO_3$, Fe, H_2S K, tritium, and EC. Well level data are tabulated and graphed, and transmissivity and storage coefficient test results are summarized. The results of an inventory of existing wells and springs in the test area are summarized, and chemical analyses of waters from these sources are tabulated. Discharge rates of several springs in the area are graphed for the period March 1972 through May 1974.

ABSTRACT

Accession Number:
@ 510.5
Knutson, C.F., Oct. 1973, Results of initial alluvial water quality program, May 4, 1973 to Aug. 2, 1973: CER Geonuclear Corp., Las Vegas, Nevada.

Contact: USGS Library (loan)

Key Categories: COLORADO, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 002 Use Code: 02

This report summarizes preliminary results from the sampling of wells in the vicinity of the Project Rio Blanco nuclear blast. The program involved the drilling and subsequent sampling of seven alluvial wells and the sampling of five additional pre-existing wells. The wells are along the upper reaches of and tributaries to the Piceance Creek. Weekly water samples were collected from these wells during the period May 24, 1973 to August 3, 1973. Analysis of these samples determined that there was not a significant change in water quality nor was any radioactivity detected (above background).

This report tabulates water quality analyses of pre-and post-detonation water samples and plots trends in total dissolved solids. Water level data are tabulated and several wells sheets presented.

ABSTRACT

Accession Number:
@ 510.6
Knutson, C.F., May 3, 1973, Predetonation hydrologic testing for period Feb. 1, 1973 to May 1, 1973: CER Geonuclear Corp., Las Vegas, Nevada, 36 p. plus appendices.

Contact: USGS Library (loan)

Key Categories: COLORADO, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 002 Use Code: 02

This report presents the results of hydrologic testing from February 1973 through May 1973 in the vicinity of the Project Rio Blanco nuclear blast. The report discusses and interprets the results of testing of five wells. (Data from wells tests and water quality analyses are tabulated.) Appendices outline the basic equations and concepts used in the multirate analyses of well tests and present daily drilling reports.

ABSTRACT

Accession Number:
@ 510 7
Knutson, C.F., March 1973, Rio Blanco hydrologic testing through Jan. 30, 1973: CER Geonuclear Corp., Las Vegas, Nevada, 5 p. plus appendices.

Contact: USGS Library (loan)

Key Categories: COLORADO, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 02

This report presents the results of hydrologic testing through January 30, 1973 in the vicinity of the Project Rio Blanco nuclear blast. The results from drilling and completion testing and sample of wells are presented and discussed, and the detailed data and analyses are given in appendices. The report included daily drilling reports, calculations of transmissivity, water quality analyses of produced waters, and tabulating, graphical displays and other interpretations of temperature and conductivity logging and of cement bond and spinner logging.

ABSTRACT

Accession Number:
@ 510.8
Knutson, C.F., July 1971, Appendix D, Project Rio Blanco, hydrology of the Piceance basin: CER Geonuclear Corp., Las Vegas, Nevada, 79 p.

Contact: USGS - Library (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SPRINGS

Access Code: 002 Use Code: 02

This report overviews and interprets the hydrology of the northern part of the Piceance structural basin (Piceance Creek-Yellow Creek drainage basin) focusing on the study area within a five-mile radius of the Project Rio Blanco Site (along Fawn Creek).

The report discusses the surface water system (rainfall and flow rates, drainage basins, water quality, and spring) and groundwater system (alluvium aquifers and Green River groundwater system). A large number of hydrologic and geologic cross sections, stream-level contour maps, and piezometric maps are presented. Other maps show flow direction, relative linear density, gross thickness, and maximum flow velocities. Tabulations of water quality data, mostly from other reports, are presented for springs and wells in the area, as well as results of several pumping tests.

ABSTRACT

Accession Number:
@ 511
Krause, J.B., McLean, W.J., Veblen, R., and Gann, D.E., June 1980, Mineralogy-groundwater quality: a study of in situ retorted oil shale: report pepared by Colorado School of Mines Research Institute Report, Golden, Colorado, for U.S. Environmental Protection Agency, Ada, Oklahoma, 85 p.

Contact: Jerry Krause (copy)

Key Categories: LEACHING, IN-SITU

Access Code: 011 Use Code: 01

This study was undertaken to develop information toward assessing the potential for impact on groundwater by an in situ oil shale retorting industry. The report involves a study of in situ retorted oil shale samples from two retorts (11 and 1) of the Geokinetics, Inc., development site, south of Vernal, Utah.

Samples from zones subjected to different temperatures wihtin the two sampled retorts were examined by a variety of mineralogic techniques for the purpose of gaining insight into the identification and mode of occurrence of minerals in the spent shales. These mineralogic data assisted in interpreting the data obtained from column and bottle water leaching tests.

Electron microscopy was used for detailed examination and characterization of samples. During examination of high-temperature spent shale, this technique (1) characterized very small grain sizes of ~100Å diameter, (2) identified defect structures in the crystalline components, and (3) identified the presence of free lime (CaO).

Leaching tests showed that water in contact with some spent shales will produce pH values as high as 11.6. Total dissolved solids content as high as about 10,000 mg/l was achieved in some leach solutions. Maximum levels of analyzed components found in leach solutions were as follows: boron -- 6.7 ppm, fluoride -- 13 ppm, arsenic -- 306 ppb, selenium -- 1,300 ppb, molybdenum -- 17.1 ppm.

X-ray diffraction examination of samples before and after leaching identified the presence of typical minerals expected to be formed during metamorphism of siliceous carbonate rock. Residues from leaching were shown to contain reduced amounts of silicate minerals. This unusual fact has been interpreted to be the result of corrosion and leaching of silicates by the high-alkaline pH condition. The high pH, in turn, is undoubtedly a result of the presence of free lime, identified by electron microscopy.

ABSTRACT

Accession Number:
@ 512
Kuiper, C.J., Piceance Basin spring hydraulics investigation: final technical report to USGS by Colorado State Engineer, Division of Water Resources, 54 p., plus Appendices A and B.

Contact: none

Key Categories: COLORADO, SPRINGS

Access Code: 002 Use Code: 01

The purpose of this investigation was to provide baseline data on spring flows and hydraulics in the Piceance Basin in order to assure proper evaluation and prediction of the impact of oil shale development on the water resources of the basin.

Data were collected on spring discharge and water quality by establishing a permanent monitoring network. Remote sensing techniques were utilized to locate springs throughout remote areas of the 900 square mile basin. Data were also collected on water diversions in the basin for both surface and ground water.

These data were used to determine the source of supply for the 78 springs included in the monitoring network. Additional geological and ground water field data were obtained using geophysical techniques to aid in the determination of spring sources.

This report summarizes the results of this investigation. It presents an estimated average annual water balance for Piceance Basin, summarizes diversion data and low-flow irrigation diversion, and it tabulates water quality for 2 springs and monthly discharge data and hydrographs are presented for 78 springs. The report also tabulates locations and average discharge data for some 400 additional small springs not included in the monitoring program.

ABSTRACT

Accession Number:
@ 512.1
Kuo, M.C.T., Park, W.C., Lindemanis, A., Lumpkin, R.E., and Compton, L.E., 1979, Inorganics leaching of spent shale from modified in situ processing: in Proceedings of the 12th Oil Shale Symposium, Golden, Colorado, Colorado School of Mines Press, p. 81-93.

Contact: Colorado School of Mines (copy)

Key Categories: LEACHING, IN-SITU

Access Code: 011 Use Code: 01

One of the technical uncertainties in conventional oil shale retorting is how to effectively dispose of retorted shale. Soluble compounds in the rock might pollute local streams and rivers if disposal is carelessly handled. Occidental Petroleum Corporation has developed a modified in situ (MIS) process for retorting oil shale that promises to make shale oil production economically feasible, and at the same time appears to reduce the risk of environmental impact.

This paper presents the results of a series of laboratory tests that examine the chemical reactions in the inorganic part of oil shale during retorting. A model is developed for leaching retorts, based on laboratory data. This model is then used to predict leaching behavior of field retorts. Rock cored from a spent in situ retort was analyzed to confirm the laboratory work.

ABSTRACT

Accession Number:
@ 513
Kuo, M.S., 1975 Precipitation trend and storm analysis in Colorado:
M.S. Thesis, Colorado State University, Fort Collins, CO, 64 p.

Contact: NTIS (copy)

Key Categories: COLORADO, CLIMATE

Access Code: 002 Use Code: 02

The precipitation trend in Colorado was studied statistically using 56 years of data collected at 61 stations. The precipitation is found to have an annual decrease of 0.01 inches over the 56 year period although this result was not statistically significant. Precipitation periods (referred to as storms) were used to describe the variation of the precipitation in space and time. The state of Colorado was divided into six geographic regions, and area weighted hourly precipitation data were summed to obtain the volume of water yielded by each storm. It was found that 80% of the annual volume is produced by 30% of the storms. The western third of the state shows no marked seasonal variation in precipitation, but the southern half receives more precipitation than the northern half. The middle third of the state receives 60% of its precipitation in the summer, and the eastern part, the high plains receives 80% during the summer months. Thunderstorms predominate during the summer, large scale storms in the winter. The summer precipitation volume is correlated with the annual volume in all regions. After categorizing the storms events of all sizes than the driest years with no noticeable change in the distribution of the size of the storms.

ABSTRACT

Accession Number:
@ 513.1
Kuo, M., and Cox, S.K., June 1975, Analysis of Colorado precipitation: Completion Report Series no. 63, Fort Collins, Colorado, Colorado State University, 36 p.

Contact: Environmental Resources Center (copy)

Key Categories: COLORADO, CLIMATE

Access Code: 011 Use Code: 01

This report summarizes the results of "trend" and "storm" analyses of Colorado precipitation data. In the trend studies, stations with 56 years of precipitation were analyzed to determine if there were any significant trends in regional and statewide precipitation in Colorado. In their storm studies, stations with 20 years of hourly, precipitation data were used to represent precipitation events, called 'storms' and the data were examined to determine storm frequency, length and yield both of these analyses included stations at Grand Junction, Rifle, and Meeker, Colorado.

It was found that no statistically significant trend, in the statewide precipitation for a 56 year period could be detected. When data from adjacent stations were analyzed, it showed that single station precipitation data may be used to realistically represent an area average precipitation value. The characteristics of precipitation events of different sizes were computed and analyzed in detail from a 20 year set. The annual precipitation of Colorado is produced by large scale disturbances in the water and by thunderstorms in the summer, and 80 percent of the precipitation volume is produced by 30 percent of the storm occurrences. The average storm duration is greater for the mountainous regions, and the volume of precipitation in the summer is better correlated with the annual volume than is the winter volume in all regions.

ABSTRACT

Accession Number:
@ 513.2
Lane, W.L., Gibbs, A.E., and Main, R.B., 1976, Stochastic approach to the Colorado River basin: presented at the National Water Resources and Ocean Engineering Convention of the ASCE, April 1976, San Diego, CA, Preprint 2684, 25 p.

Contact: ASCE (copy)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS, SURFACE WATER QUANTITY, SALINITY

Access Code: 002 Use Code: 02

The stochastic approach to hydrology may be successfully applied to large river basins with several interdependent tributary inflows. Quality, specifically total dissolved solids, may be successfully generated jointly with flow. In actual application to the Colorado River basin, results were obtained which are valuable for planning and evaluation purposes. By using stochastically generated flows and qualities, the effects of various structural or nonstructural measures in the basin may be more realistically assessed under a variety of potential future flow and salinity conditions. If the measures had been analyzed with the set of historical flows and salinities, the assessment would have been incomplete and biased. This approach is expected to be applicable to other basins with similar success.

ABSTRACT

Accession Number:
@ 513.3
Lansford, R.R., Roach, F., Gollenhon, N.R., and Creel, B.J., July 1981, Agricultural implications of reduced water supplies in the Green and Upper Yellowstone River basins: Los Alamos Scientific Laboratory Rep. LA-8925-MS, v.1, 79 p.

Contact: NTIS (copy)

Key Categories: UTAH, PRESENT WATER USE, PROCESS WATER USE

Access Code: 011 Use Code: 01

The growth of the energy sector in the energy-rich but water-restricted Western U.S. has presented a potential conflict for water now used by the irrigated agricultural sector. This study measures the direct impacts on farm income and employment resulting from the transfer of water from agriculture to energy in two specific geographical areas - the Green and Upper Yellowstone River Basins. A linear programming model was used to evaluate the impacts of reduced water supplies. Through the use of regional multipliers, the analysis was expanded to include regional impacts. In the Green River basin, the Duchesne and Uintah Counties, Utah, were found to experience the greatest economic impacts when agricultural water supplies were reduced by 50%. In the Upper Yellowstone River Basin, Treasure and Rosebud Counties, Montana, would experience the greatest total income and employment reductions when water supplies were reduced ≤ to 40%. When these supplies were reduced by more than 40%, Stillwater, Carbon, Yellowstone, and Big Horn Counties, Montana, would experience the greatest reductions.

ABSTRACT

Accession Number:
@ 514
LaPray, B.A., and Hamblin, L.S., 1980, Bibliography of U.S.
Geological Survey water resources reports for Utah: Utah Department
of Natural Resources Information Bulletin No. 27, 75 p.

Contact: USGS - Salt Lake City (copy)

Key Categories: UTAH, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, BIBLIOGRAPHY

Access Code: 011 Use Code: 01

This bibliography contains a complete listing to June 30, 1980, of reports relating to the water resources of Utah prepared by personnel of the U.S. Geological Survey. Discussions of the related subjects of geology, hydrology, and chemical quality of the water are included in many of the reports. The reports were, for the most part, prepared by personnel assigned to the Water Resources Division, Utah District, in cooperation with State and local agencies.

The bibliography is divided into four major parts: (1) publications of the Geological Survey; (2) publications by agencies of the State of Utah; (3) other publications--reports prepared by Survey personnel, but published by other agencies or by professional organizations in their journals; and (4) reports of the U.S. Geological Survey.

ABSTRACT

Accession Number:
@ 514.1
Laramie Energy Research Center, October 1977, Environmental impact assessment, oil shale in situ processing research program for Laramie Energy Research Center, Rock Springs, Sweetwater County, Wyoming; Laramie, Albany County, Wyoming; and Utah: Rep. EIA/UGS1/78.

Contact: Dick Poulson (loan)

Key Categories: UTAH, WYOMING, ENVIRONMENTAL, IN-SITU

Access Code: 002 Use Code: 02

This report is an environmental impact statement on in situ experimental field sites used by Laramie Energy Technology Center near (1) Rock Springs, Wyoming; (2) Laramie, Wyoming; (3) in Utah. The report focuses on the two Wyoming sites.

The report describes the in situ technology under development at these sites and the air quality; water quality; biological resources; aesthetic, recreational and cultural aspects; and socioeconomic environment at these sites. The potential impacts of the proposed experimental operations on these elements are described, and the legal framework governing these experiments is presented. Appendices summarize relevant biological data for the area.

ABSTRACT

Accession Number:
@ 514.2
Laronne, J.B., 1981, Dissolution kinetics of surficial Mancos shale-associated alluvium: Earth Surface Processes and Landforms, v. 6, p. 541-552.

Contact: Jonathan Laronne (copy)

Key Categories: COLORADO, SALINITY

Access Code: 011 Use Code: 02

Inquiry into the dissolution kinetics of naturally occurring geologic materials, rather than individual mineral species, has been relatively neglected. This is especially true of surface processes, the realm of surface water hydrology and geomorphology. This paper focuses attention at a laboratory study of the rate of such complex reactions.

Functions defining the dissolution rates of saline (0·1-20 per cent salt content) Mancos Shale-associated alluvium in distilled water follow varying patterns. Dissolution is characterized by an initial (5 min) high rate constant, by a following phase (20 min-57 h) where rates are reduced drastically, and by a final period of encroachment to equilibrium. Initial dissolution rates increase with increase in salt content and sediment:water ratio. The time necessary to approach equilibrium is, however, found to be directly proportional to the sediment:water ratio. The concentration of Na^+, Mg^{2+}, Ca^{2+}, $SO^{2-}/_4$ and HCO_3, and the relative abundance of Ca^{2+} and HCO_3 increase continuously with contact time, indicating that the hydrated sodium and magnesium sulphate minerals provide most of the initial solutes, though not necessarily most of the total solute bulk.

The results obtained in this study indicate that the high initial dissolution rate of soluble minerals from alluvium, and particularly from shales in contact with aqueous solutions, is too short-lived to account for most of the solutes occurring in heavily sediment-laden surface flow. Excluding input from slower, usually supersaturated subsurface flow, dissolution from sediment in transport should be a major source of solutes in originally undersaturated and kinetically unequilibrated surface water in semiarid and arid regions.

ABSTRACT

Accession Number:
@ 514.3
Laronne, J.B., 1977, Dissolution potential of surficial Mancos shale and alluvium: Ph.D. Dissertation, Fort Collins, Colorado State University, 128 p.

Contact: University Microfilms International (copy)
NTIS (copy)

Key Categories: COLORADO, UTAH, SALINITY

Access Code: 002 Use Code: 02

The objectives were to determine the salt content of Mancos shale and associated alluvium and the release mechanisms of salt from these deposits. When mixed with distilled water, the time necessary to approach equilibrium decreased with an increase of salt content and with a decrease of sediment concentration, and the time span required for equilibrium ranged from a few minutes to several days. The chemical quality of the aqueous mixtures was of the CA2+-MG2+-NA1+-SO42--NCO31-type. Sodium and magnesium hydrated sulfates appeared to dissolve faster than gypsum or calcite and the relative abundance of NA1+, MG2+ and SO42- decreased with increased dilution. There is a large inherent variability in the salt content of sampled sediments. Soluble mineral content of Mancos shale from hillslopes (2 percent) is significantly larger than that of terrace alluvium (0.62-0.29 percent) and bed materials (0.93-0.81 percent) of North Miller and West Salt Creeks respectively. The most saline deposits (10 percent) are efflorescent bed crusts. Terrace and bed materials in narrow valleys where shallow alluvium overlies shale are highly saline (1.6 percent) and show an increase in salt content with depth. The results also show that major areas of diffuse sources of salts are also the major sediment contributors in the upper Colorado River basin.

ABSTRACT

Accession Number:
@ 514.4
Laronne, J.B., and Schumm, S.A., 1977, Evaluation of the storage of diffuse sources of salinity in the Upper Colorado River basin: Fort Collins, Colorado, Colorado State University completion report series no. 79, 111 p.

Contact:

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 011 Use Code: 01

This report summarizes the results of a research program to determine the amount of salt stored in alluvium material and associated with Mancos shale and to determine the relationship between sediment yield and salt yield by studying the physical and chemical dissolution processes of geologic materials.

The results from the experiments on the amount of dissolution and dissolution rates upon dilution indicate that the true salt load from diffuse sources of salinity may be much larger than presently assumed. Chemical analyses of samples from a single low magnitude flow event in West Salt Creek show that stormflow salinity is considerably influenced by the soluble mineral content of bed and lower bank materials. Results also confirm that major areas of diffuse sources of salinity in the Upper Colorado River Basin are also major sediment contributors. Hence, gullying will significantly increase the sediment and salt load of channels in saline alluvium and in Mancos Shale bedrock.

ABSTRACT

Accession Number:
@ 515
Law Engineering Testing Co., 1981, Hydrologic and geologic characterization of the Geokinetics Seep Ridge Site, Phase I: report prepared for Geokinetics, Inc., Salt Lake City, Utah.

Contact: Bill Sharrer (copy)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE, UTAH

Access Code: 011 Use Code: 01

This report describes the local and regional surface and subsurface hydrologic system in the vicinity of the Geokinetics Seep Ridge experimental site. The report reviews, tabulates, and displays information from published and unpublished data and literature. The report also analyzes potential hydrologic impacts from the Geokinetics true in situ process, and it presents a study plan to provide detailed baseline descriptions and impact analyses.

The report includes a large number of tables and figures which summarize climatic, streamflow, water quality, and other hydrologic data. It also includes an annotated bibliography on the hydrology and geology of the Seep Ridge site and the Uinta basin.

ABSTRACT

Accession Number:
@ 515.1
Lawrence, D., 1974 Utah: in Proceedings of the synthetic hydrocarbons conference: New York, American Inst. of Mining, Metallurgical, and Petroleum Engineers, Inc., p. 99-101.

Contact: none

Key Categories: UTAH, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 03

Most of the eastern half of Utah lies in the Colorado River drainage. The Uintah Basin, which contains all of the known oil shale in Utah, is drained by the Duchesne River and the White River, which are tributaries to the Green. In South Central Utah, which contains the most extensive coal resources, the principal water supplies are Lake Powell and tributaries entering the Green and the Colorado from the west. These include the Price River, the San Rafael, the Muddy, the Fremont, the Escalante, and the Paria Rivers.

The opportunities for using water in Utah are generally greater than the supply which is physically and legally available, due to interstate compacts and international treaties, and intrastate water regulations and policies. Theoretically, most of the streams are fully appropriated; in fact on nearly all streams of the Colorado River drainage there are applications of record for much more water than is physically available. In some instances there are more approved applications than there is water.

ABSTRACT

Accession Number:
@ 515.2
Lawrence Berkeley Laboratory, March 1981, Oil shale and coal research: chapter from the energy and environment division annual report 1980, J.P. Fox, ed., Lawrence Berkeley Laboratory Rep. LBL-11989, 82 p.

Contact: Gloria Gill - LBL (copy)

Key Categories: EFFLUENTS, IN-SITU, SURFACE, RECLAMATION, COLORADO, COMPUTER MODELS, LEACHING

Access Code: 011 Use Code: 01

This annual progress report presents individual technical articles which summarize the results of research on environmental aspects of oil shale conducted during fiscal year 1980 at Lawrence Berkeley Laboratory. The report covers characterization, and partitioning studies, retort abandonment, and waste water treatment studies. The characterization studies section includes articles on the speciation of arsenic and the identification of carboxylic acids in several in situ process waters and on the determination of major, minor and trace elements in two cores from the Naval Oil Shale Reserve No. 1. The partitioning section includes articles on a theoretical model of the distribution of Hg during in situ retorting, on the distribution of As, Cd, Hg, Pb, Sb, and Se during laboratory-scale in situ retorting, and on the analysis of trace elements in gaseous and other byproducts of retorting. The retort abandonment section discusses the development of low cost grouts from spent shale, modeling of penetration distance of spent shale grouts in abandoned in situ retorts, leaching of organic carbon from in situ spent shale, and the dewatering of an in situ retorting site. The spent shale to treat process waters, on steam stripping of process waters, and on analytical problems in monitoring retort water treatment.

ABSTRACT

Accession Number:
@ 515.3
Lawrence Berkeley Laboratory, 1980, Oil shale research: chapter from the energy and environment division annual report 1979, J.P. Fox, ed., Lawrence Berkeley Laboratory Rep. LBL-10486, 67 p.

Contact: Gloria Gill - LBL (copy)

Key Categories: SURFACE, IN-SITU, RECLAMATION, LEACHING, EFFLUENTS, COMPUTER MODELS, COLORADO

Access Code: 011 Use Code: 02

This annual progress report presents individual technical articles which summarize the results of research on environmental aspects of oil shale conducted during fiscal year 1979 at Lawrence Berkeley Laboratory.

The report covers characterization, ecological, trace element, and waste water treatment studies and retort abandonment. The characterization section includes articles on the organic and inorganic speciation of in situ process waters and on elemental analyses of raw shale cores from the Naval Oil Shale Reserve No. 1. The ecological section describes a study of the effects of retort water on benthic freshwater organisms. The trace element section presents mass balance studies of simulated in situ retorts and describes a laboratory program to investigate the distribution of As, Cd, Hg and Se during in situ retorting. The wastewater treatment section describes the results of investigations of oil and grease removal by coagulation and flocculation and of spent shale treatment. The retort abandonment section evaluates various control technologies for abandoning in situ retorts, describes the results of laboratory studies to develop a hydraulic cement out of Lurgi spent shale, and discusses leachate production from in situ retorts.

ABSTRACT

Accession Number:
@ 518
Leaf, C.F., and Brink, G.E., May 1973, Hydrologic simulation model of Colorado subalpine forest: U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

Contact: DRI (loan)

Key Categories: COLORADO, COMPUTER MODELS

Access Code: 042 Use Code: 02

A simulation model specifically designed to determine the probable hydrologic changes resulting from watershed management in the Colorado subalpine zone is described. The model simulates the total water balance on a continuous year-round basis and compiles the results from individual hydrologic response units into a "composite overview" of an entire drainage basin. Preliminary results are summarized for an 8-year test period on a 667-acre experimental watershed.

ABSTRACT

Accession Number:
@ 519
Leavesley, G.H., 1978, A hydrologic model for predicting the impacts of energy-resource development: in Applied Numerical Modeling, Brebbia, C.A., ed., Pentech Press, Ltd., London, p. 225-234.

Contact: none

Key Categories: COLORADO, COMPUTER MODELS, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 01

The watershed model is a deterministic physical-process model. It can be applied to basins, like those in northwestern Colorado, where snow is the major form of precipitation and the major source of annual runoff. Daily air temperature, solar radiation, and precipitation are the input variables of the model. The model area is partitioned into homogeneous subunits (hydrologic-response units), based on climate, vegetation, physiography, and soils. The watershed can be envisioned as a series of linear and nonlinear reservoirs that combine to produce the total system response for a given basin. Outputs of the soil zone, subsurface, and groundwater reservoirs are combined and weighted on a hydrologic response unit area basis to simulate mean daily streamflow. The model is divided into three areas of hydrologic emphasis. These are the phase components, climatic components, and snow components. Modifications to any of these components can be used to evaluate the impacts of development on the hydrologic system.

The model was applied to 1400-km^2 area of Piceance basin. This area was chosen because of the overall limited data on the entire basin area. The simulated area was divided into 22 hydrologic response units, and the model was used to simulate natural discharge from the basin for a nine-year period of record.

ABSTRACT

Accession Number:
@ 519.1
Lebsack, M.E., Anderson, A.D., DeGraeve, G.M., and Bergman, H.L., 1981, Comparison of bacterial luminescence and fish bioassay results for fossil-fuel process waters and phenolic constituents: in Aquatic Toxicology and Hazard Assessment: Fourth Conference, ASTM STP 737, Branson, D.R. and Dickson, K.L., eds., American Society for Testing and Materials, p. 348-356.

Contact: Harold Bergman (copy)

Key Categories: EFFLUENTS, SURFACE, IN-SITU

Access Code: 011 Use Code: 01

A number of fossil-fuel process waters and some phenolic constituents were tested in a luminescent bacterial system, and the results were compared with either static or flow-through acute bioassays with fish. Luminescence was decreased in a concentration-dependent manner after the addition of an oil shale process water. The concentration causing 50 percent inhibition of luminescence (EC_{50}) was reproducibly determined for all the tested waters and compounds. The EC_{50} values for a group of fossil-fuel process waters correlated with 96-h rainbow trout flow-through median lethal concentrations (LC_{50}s) but now with 96-h flow-through LC_{50}s for fathead minnows. For another group of process waters, the EC_{50}s for luminescence inhibition had a significant correlation to static 24-h LC_{50}s with fathead minnows. Both rainbow trout and fathead minnow LC_{50}s were lower than luminescence EC_{50}s for the phenolic compounds. Inhibition of bacterial luminescence may be of value in predicting the toxicity of complex effluents to aquatic biota, especially when semicontinuous monitoring is required. However, in each case the bacterial bioluminescence assay should be calibrated periodically with acute bioassays using aquatic biota.

ABSTRACT

Accession Number:
@ 519.2

Lebsack, M.E., Anderson, A.D., Nelson, K.F., and Farrier, D.S., 1980, Sublethal effects of an in-situ oil shale retort water on rainbow trout: Toxicology and Applied Pharmacology, v. 54, p. 462-468.

Contact: Harold Bergman (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

An in situ oil shale process water, designated Omega-9 water, was used in sublethal concentrations in flow-through bioassays with rainbow trout. Exposure for 96 hr to 0.3% of Omega-9 water (approximately 70% of the LC50) decreased blood packed cell volume (PCV) and hemoglobin concentration. This concentration of Omega-9 water also decreased plasma alkaline phosphatase (AP) activity and protein concentration and caused threefold increases in plasma ammonia levels. Exposure to sublethal concentration of a solution of the 13 major inorganic constitutents of Omega-9 water also decreased PCV and plasma AP activity and increased plasma ammonia levels. This study also found that no sublethal effects on blood hemoglobin, protein and alkaline phosphatase occurred at a toxic level less than a fifth of the level of the LC50.

ABSTRACT

Accession Number:
@ 519.3
Lee, K., and others, Dec. 1975, Geologic and mineral and water resources investigations in Western Colorado, using Skylab EREP data, report: Remote Sensing Rep. 75-7, 320 p.

Contact: NTIS (copy)

Key Categories: COLORADO, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 03

Skylab photographs are superior to ERTS images for photogeologic interpretation primarily because of improved resolution. Similarly, S190B photos provide more geologic advantage over good color photography; S190B stereo color photos, where available, provide maximum geologic information. Water resource studies can use skylab photography for interpretation of drainage, hydrogeology, and groundwater flow. S190A stereo color photography is adequate for defining drainage divides that in turn define the boundaries and distribution of groundwater recharge and discharge areas within a basin. Skylab S190B stereo photography has sufficient resolution to map hydrogeologic units and structures that may be sufficient for regional studies. Aircraft photography and field work are still necessary to produce an accurate hydrogeologic map.

ABSTRACT

Accession Number:
@ 519.4
Leeheer, J.A., Noyes, T.E., Stuber, H.A., 1982, Determination of polar organic solutes in oil-shale retort water: submitted to Environmental Science and Technology, 36 p.

Contact: Jerry Leenheer (copy)

Key Categories: IN-SITU, EFFLUENTS

Access Code: 011 Use Code: 01

A variety of analytical methods were used to quantitatively determine polar organic solutes in process retort water and a gas-condensate retort water produced in a modified in situ oil-shale retort. Specific compounds accounting for 50% of the dissolved organic carbon were identified in both retort waters. In the process water, 42% of the dissolved organic carbon consisted of a homologous series of fatty acids from C_2 to C_{10}. Dissolved organic carbon percentages for other identified compound classes were: Aliphatic dicarboxylic acids (1.4%); phenols (2.2%); hydroxypyridines (1.1%); and aliphatic amides (1.2%). In the gas-condensate retort water, aromatic amines were most abundant at 19.3% of the dissolved organic carbon; followed by phenols (17.8%); nitriles (4.3%); aliphatic alcohols (3.5%); aliphatic ketones (2.4%); and lactones (1.3%). Steam-volatile organic solutes were enriched in the gas-condensate retort water, whereas nonvolatile acids and polyfunctional neutral compounds were predominant organic constituents of the process retort water.

ABSTRACT

Accession Number:
@ 520
Leenheer, J.A., and Stuber, H.A., 1981, Migration through soil of organic solutes in an oil-shale process water: in Environmental Science and Technology, v. 15, no. 12, p. 1467-1475.

Contact: Jerry Leenheer (copy)

Key Categories: WYOMING, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

The migration through soil of organic solutes in an oil-shale process water (retort water) was studied by using soil columns and analyzing leachates for various organic constituents. Retort water extracted significant quantities of organic anions leached from ammonium-saturated-soil organic matter, and a distilled-water rinse, which followed retort-water leaching, released additional organic acids from the soil. After being corrected for organic constitutents extracted from soil by retort water, dissolved-organic-carbon fractionation analyses of effluent fractions showed that the order of increasing affinity of six organic compound classes for the soil was as follows: hydrophilic neutrals nearly equal to hydrophilic acids, followed by the sequence of hydrophobic acids, hydrophilic bases, hydrophobic bases, and hydrophobic neutrals. Liquid-chromatographic analysis of the aromatic amines in the hydrophobic- and hydrophilic-base fractions showed that the relative order of the rates of migration through the soil column was the same as the order of migration on a reversed-phase octadecylsilica liquid-chromatographic column.

ABSTRACT

Accession Number:
@ 521
Leenheer, J.A., and Stuber, H.A., 1977-1978, Organic solute transport study of wastewaters produced by in situ oil shale retorting: progress reports for Contract PO-PL71434 submitted to Laramie Energy Technology Center by the U.S. Geological Survey.

Contact: Dick Poulson (copy)

Key Categories: LEACHING, EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

These are quarterly and annual progress reports on organic solute transport of wastewaters produced by in situ oil shale retorting. These reports cover a range of topics, many of which are treated in detail in other reports. These include absorption of organics from wastewaters onto spent shale (Abstract No. 765.1); inorganic sulfur species in in situ retort waters (Abstract No. 766); migration through soil of organic and inorganic solutes in an in situ retort water (Abstract Nos. 520, 522) and leaching of spent shale from the Geokinetics process.

The Geokinetics leaching studies have not been reported elsewhere. Samples of spent shale were collected from five zones from an early, experimental retort and column leached with distilled water at 2 mL/min. The November 1977 report summarizes the results of pH and conductivity measurements on individual pore volumes from these columns.

ABSTRACT

Accession Number:
@ 522
Leenheer, J.A., Stuber, H.A., and Noyes, T.I., 1981, Chemical and physical interactions of an in situ oil shale process water with a surface soil: in Proceedings of the 14th Oil Shale Symposium, Colorado School of Mines Press, Golden, Colorado, p. 357-375.

Contact: Colorado School of Mines (copy)
Jerry Leenheer (copy)

Key Categories: GROUNDWATER QUALITY, WYOMING

Access Code: 011 Use Code: 02

Chemical and physical interactions of an in situ oil-shale process (retort) water with a surface soil were investigated by soil and effluent analyses of three soil-column experiments whereby soil was leached with: (1) Distilled water, (2) a synthetic retort water containing only inorganic solutes, and (3) an actual retort water produced by in situ processing of oil shale. Major findings of this study include an ion exchange-precipitation reaction, in which exchangeable calcium in the soil is displaced by ammonium from retort water and precipitated as carbonate by inorganic carbon in retort water. This precipitation process affects soil permeability. Ammonium was strongly adsorbed from retort water by the soil, and was not removed by subsequent distilled-water leaching and drying.

The soil adsorbed about 40 percent of organic solutes from retort water in 9.4 pore void volumes of leachate, but retort water extracted significant quantities of natural fulvic and humic acids from the soil. The soil adsorbed ammonium, arsenic, barium, boron, cadmium, cobalt, copper, fluoride, iron, inorganic carbon, silica, and zinc from retort water. Calcium, magnesium, lithium, sodium, potassium, strontium, and manganese were extracted from the soil by retort water. Thiocyanate did not interact and was the best tracer for retort water. Thiosulfate in retort water was degraded to tetrathionate by passage through the soil column.

ABSTRACT

Accession Number:
@ 522.1
Lehmann, E.J., 1973, Water rights and water law - a bibliography with abstracts: National Technical Information Service, Springfield, Virginia.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, WATER LAW, BIBLIOGRAPHY

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 523
Levine, M.D., Steele, R.V., and Yabroff, I.W., Oct. 1975, Energy development: the environmental tradeoffs: v. 4: the background papers: Stanford Research Institute, Menlo Park, CA.

Contact: NTIS (copy)

Key Categories: ENVIRONMENTAL, COLORADO, UTAH

Access Code: 002 Use Code: 02

Background information is presented to provide detailed assessment of selected social and environmental impacts associated with general energy development as well as impacts resulting from specific technology used. A state-of-the-art view of energy conversion technologies is given; e.g., two techniques for increasing production of electricity from Western coal are direct burning of coal to produce steam, and low BTU gasification of coal; technologies for increasing liquid fuel supplies are recovery of oil from shale, coal liquefaction, oil and gas recovery from the outer continental shelf, and gas produced through use of assisted recovery; technologies for producing pipeline gas from coal now involve the Lurgi process; synthane process is promising. The social impacts of energy development in rural areas arise principally due to population increases and urbanization, with subsequent demands for housing, health services and education. Barriers to solving social problems in boom towns are absence of city planners and lack of planning expertise in city councils or other governmental agencies. Effects of energy development on non-energy uses and instream flow levels in the upper Colorado and Missouri River basins appear to be major. Conclusions concerning water quality impacts of oil shale and coal conversion processes are: direct discharge of contaminated water into streams and reservoirs can be minimized by using evaporation ponds, treating and recycling waste water, underground injection of excess water and providing catchment dams. Air pollution varies among conversion technologies and final use of the energy resource.

ABSTRACT

Accession Number:
@ 523.1
Lindskov, K.L., Kimball, B.A., 1981, Water resources of and hydrologic effects of oil-shale development in the Southeastern Uinta basin, Utah and Colorado: U.S. Geological Survey Professional Paper, (in review).

Contact: Ken Lindskov (status)

Key Categories: UTAH, ENVIRONMENTAL, SURFACE WATER QUANTITY, PROCESS WATER USE

Access Code: 002 Use Code: 01

This report evaluates the water resources impacts of proposed oil shale mining in northeastern Utah. It summarizes the results of a comprehensive hydrologic investigation of the area. Basic data obtained during 1975-80 are used to evaluate the availability of water and to recommend strategies to minimize any impacts on water resources.

The report presents the physical setting of the area and reviews and discusses climate and surface and groundwater hydrology. Alternative water supply schemes for a 400,000 barrel per day industry requiring about 70,000 acre-ft. per year of water are evaluated. These include pumping from the White River without storage, a large reservoir on the White River, pumping from the White River combined with off-channel storage in Hell's Hole Canyon, pumping from the Green River, and conjunctive use of ground and surface water.

ABSTRACT

Accession Number:
@ 523.2
Lindskov, K.L., Holmes, W.F., Kimball, B.A., and Seiler, R.L., 1981, Hydrology of the oil-shale area, Uinta basin: in Water-resources studies in Utah, July 1, 1980 to June 30, 1981, U.S. Geological Survey Open-File Report 81-903, p. 18-19.

Contact: Ken Lindskov (status)

Key Categories: UTAH, CLIMATE, SEDIMENT, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

The purpose of this continuing U.S. Geological Survey program is to determine the availability of water in the southeastern part of the Uinta basin and to identify impacts of oil-shale development on water resources. The study involves establishing a data network, analyzing existing information, and collecting and analyzing new information. Monitoring is being carried out at 18 stream-flow sites and at one alluvial well. Streamflow monitoring includes continuous flow, conductivity, temperature, common ions, nitrate plus nitrite, phosphate, sediment, trace metals, and biological sampling. Well water levels and water quality information are obtained monthly.

ABSTRACT

Accession Number:
@ 524
Lines, G.C., Feb. 1981, Hydrologic studies of the U.S. Geological Survey in major coal-resource areas of Utah through 1980: U.S. Geological Survey Open-File Report 81-216, 20 p.

Contact: Open-File Services Section (copy)

Key Categories: UTAH, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, FLOODS

Access Code: 011 Use Code: 02

This report summarizes literature and work in progress that addresses hydrologic studies in major coal areas of Utah through 1980. The major coal fields in Utah are in the Wasatch Plateau, Book Cliffs, Henry Mountains, Kaiparowits Plateau, and Alton and Kolob areas. Portions of the Wasatch Plateau and Book Cliffs coal fields are included in the southern portion of the Utah oil shale basin.

This report presents an annotated bibliography of U.S. Geological Survey reports which cover this region. The reports are listed alphabetically by author. The report also includes project summaries for work in progress.

ABSTRACT

Accession Number:
@ 524.1
Lines G.C., Plantz, G.G., 1981, Hydrologic monitoring in the coal fields of central Utah, August 1978-September 1979: U.S. Geological Survey Water-Resources Investigations Open-File Report 81-138, 59 p.

Contact: none

Key Categories: UTAH, SURFACE WATER QUALITY, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 01

Surface-water quantity and quality were observed at 12 gaging stations downstream from mined and lease areas in the Wasatch Plateau, Book Cliffs, and Emery coal fields in central Utah. Measurements of base flow were made at 52 additional sites in the region. The report describes the hydrologic setting of this important coal region and summarizes the surface-water data collected at the monitoring sites from August 1978 through September 1979. Coal mining and lease activities in each of the monitored basins also are described.

Where possible, hydrologic impacts of coal mining are evaluated. Impacts include increases in streamflow and degradation of surface-water quality due to water discharged from underground mines. Other impacts include removal of water from ground-water storage, changes in the natural ground-water flow system, and possibly the diminution of spring flows.

Adequacy of the monitoring network to detect hydrologic changes due to mining is evaluated. In order to fully assess and quantify the impacts, comprehensive studies and monitoring of the ground-water system and water produced in mines are needed.

ABSTRACT

Accession Number:
@ 525
Linstedt, K.D., Bennett, E.R., and Harding, B., Sept. 1976,
Characterization and treatment of retort water from in-situ oil shale processing: Final report to Laramie Energy Technology Center by University of Colorado, Boulder, 67 p.

Contact: Dick Poulson (loan)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

The purpose of this study was to identify processes which might be effective for the treatment of in situ oil shale retort water. Available literature on retort water production, treatment, and disposal was reviewed. Several samples of water were chemically characterized, and treatability studies were conducted.

These studies revealed that the water contained high concentrations of ammonia and carbonate and moderately high quantities of chloride, sulfate, and sodium. The treatability studies indicated that ammonia and carbonate could be effectively removed by thermal stripping or by weak acid cation exchange. Activated carbon demonstrated a good potential for reduction of organics.

ABSTRACT

Accession Number:
@ 525.1
Linstedt, K.D., and Kruger, P., Feb. 1969, Vanadium concentrations in Colorado River basin waters: Journal American Water Works Association, v. 61, no. 2, p. 85-88.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

Vanadium is a trace element in water supplies which is of significance because of its possible physiological effects; for example, it has been shown at low intake levels to act in the inhibition of cholesterol synthesis. The success of the studies on vanadium concentrations in natural water in the Colorado River basin was based on the specific development of a sensitive neutron activation analysis procedure which allowed for sensitivity of 0.1 micrograms of vanadium. Vanadium concentrations in samples throughout the Colorado River basin varied between 0.2 and 49.2 micrograms/liter over the 15-month period of the study. The lowest amounts of vanadium were found upstream from any industrial activity.

ABSTRACT

Accession Number:
@ 526
Lofgren, B.E., 1954, Ground-water conditions in the Upper Colorado River basin: U.S. Geological Survey Open-File Report, p. 6.

Contact: Open-File Services Section (copy)

Key Categories: UTAH, COLORADO, WYOMING, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 526.1
Loo, W.W., Markley, D.E., and Munson, S.D., 1979, Geology and geohydrology elements of the environmental research plan, BX in situ oil shale project, Rio Blanco County, Colorado: Rep. SAN-1747-T2.

Contact: Laramie Energy Technology Center Library (loan)

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 01

This report was prepared as a part of the overall environmental research plan for the BX In Situ Oil Shale Project. The project is located in the central portion of the Piceance Creek basin of northwestern Colorado. Within this basin is a section of oil shale-bearing rocks in the Parachute Creek member of the Green River Formation commonly referred to as the leached zone which contains very large reserves of in-place oil shale. This zone has enough permeability and porosity to permit in situ retorting without resorting to mining and/or other fracturing techniques.

The purpose of the project is to demonstrate the technical feasibility of using superheated steam at 1000° F and 1500 psig as a heat carrying medium to retort oil shale in the leached zone in situ and to provide a mechanism for the recovery of this oil with minimum impact on the environment. More specifically, the oil shale will be retorted by injecting the superheated steam into the leached zone through an array of injection wells abd recovering the steam/water/oil abd gas produced from the zone through an array of production wells.

ABSTRACT

Accession Number:
@ 527
Loucks, R.A., Nov. 1979, Occidental vertical modified in situ process for the recovery of oil from oil shale, phase I, quarterly progress report Nov. 1, 1976 - April 30, 1979: v. 2, Rep. DOE/LC/10036-T4 630 p.

Contact: NTIS (copy)

Key Categories: PROCESS WATER USE, LEACHING, EFFLUENTS

Access Code: 011 Use Code: 02

This report presents analyses in all of the broad environmental areas identified in the Development Monitoring Program for data collected since November 1976. Because there is always a data-lag and reduction problem, analyses for some studies are based on data only through September 1978. The Interim Monitoring and Development Monitoring Programs have been reduced and changed from the Environmental Baseline Monitoring Program in many areas. Therefore, emphasis is now placed on key indicators of environmental quality and/or change which are evaluated in this report. The purpose of this report is to fulfill the requirement of the lease to provide the Area Oil Shale Supervisor's Office with an annual report of environmental analyses. Environmental monitoring and analyses are continuing on Oil Shale Tract C-b. Development activities commenced within the past year have resulted in increased activity on the Tract in the form of off road vehicular use, facility construction, shaft sinking, and traffic into and out of the area. All activity has been conducted within strict adherence to environmental, permit, and lease regulations. Environmental impacts, where they exist, have been confined to the immediate area and within limits defined in the Detailed Development Plan.

ABSTRACT

Accession Number:
@ 528
Loucks, R.A., Feb. 1979, Occidental vertical modified in situ process for the recovery of oil from oil shale - phase I: quarterly progress report for the period Nov. 1, 1978 - Jan 31, 1979, U.S. DOE Rep. SAN-1848-T1, 786 p.

Contact: NTIS (copy)

Key Categories: COLORADO, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, IN-SITU, CLIMATE, EFFLUENTS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 02

This is a quarterly progress report on the Occidental Logan Wash experimental site. Appendix B reports environmental data collected at the Logan Wash mine site during 1978. Water quality analyses of surface water and groundwater for 41 monitoring sites and 45 parameters are summarized. Quarterly wind roses are presented for the meteorological tower and for the mechanical weather station.

ABSTRACT

Accession Number:
@ 529
Loucks, R.A., March 1979, Occidental vertical modified in situ process for the recovery of oil from oil shale - phase I: annual report for the period Nov. 1, 1977 - Oct. 31, 1978, v. 2, U.S. DOE Rep. SAN-1848-T2, 553 p.

Contact: NTIS (copy)

Key Categories: RECLAMATION, IN-SITU

Access Code: 011 Use Code: 02

This report summarizes progress on Phase I of a two-phase agreement between Occidental Oil Shale, Inc. and the U.S. Department of Energy for the period November 1, 1977 through October 31, 1978. Phase I of the project is the engineering development of the Occidental modified in situ process for recovery of shale oil at the Logan Wash, Colorado site. Volume II summarizes the status of environmental permits for Retort 6 and presents the proposed reclamation plan for tract C-b.

ABSTRACT

Accession Number:
@ 529.1
Loucks, R.A., Aug. 1978, Occidental vertical modified in situ process for the recovery of oil from oil shale, Phase I, quarterly progress report from the period May 1, 1978 thru July 31, 1978: U.S. DOE Rep. TID-28943, 306 p.

Contact: NTIS (copy)
LETC Library (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY, GROUNDWATER QUALITY, EFFLUENTS, IN-SITU

Access Code: 002 Use Code: 03

This is a quarterly progress report that cover the period May 1 - July 31, 1978 under the scope of work for Phase II of the DOE/Occidential Oil Shale Cooperative Agreement. Appendices to this report present the result of ground and surface water quality monitoring and tabulate analyses of several process waters.

ABSTRACT

Accession Number:
@ 530
Loucks, R.A., Feb. 1978, Occidental vertical modified in situ process for the recovery of oil from oil shale - phase I: quarterly progress report for the period Nov. 1, 1977 - Jan. 31, 1978: U.S. DOE Rep. TID-28917, 394 p.

Contact: NTIS (copy)

Key Categories: COLORADO, CLIMATE

Access Code: 011 Use Code: 02

This report summarizes progress on Phase I of a two-phase agreement between Occidental Oil Shale, Inc. and the U. S. Department of Energy for the period November 1, 1977 - January 31, 1978. The reports and its appendices summarize the status of environmental permits for tract C-b and present baseline meteorological measurements of wind speed, wind direction, and vertical temperature gradient at Logan WAsh, Colorado from February 1975 through November 1976.

ABSTRACT

Accession Number:
@ 531
Loucks, R.A., Nov. 1977, Occidental vertical modified in situ process for the recovery of oil from oil shale - phase I: v. II--summary report, Nov. 1, 1976 - Oct. 31, 1977: U.S. DOE Rep. TID-28053/2, 402 p.

Contact: NTIS (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, SPRINGS, PROCESS WATER USE, IN-SITU

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 532
Lowham, H.W., 1982, Streamflows and channels of the Green River basin, Wyoming: U.S. Geological Survey Water-Resources Investigation 81-71, 73 p.

Contact: Hugh Lowham (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 01

Width, depth, cross-sectional area, and velocity of streamflow were depicted for 51 gaged sites in or near the Green River basin of Wyoming by summarizing data obtained from current-meter discharge measurements. Relations developed by this method vary from site to site depending on channel features unique to each location. Using these at-a-station relations as a base, regional relations were then developed that characterize hydraulic features of streams throughout the study area.

Channel size is an indication of flow magnitude. High flows affect channel formation, and the annual peak-flow array is a representation of these flows. The geometric mean of this array is considered to be a viable statistical index of channel-forming flows because it represents the relative magnitude of high flows at a site. Bankfull discharge is a physical index of flows dominating channel formation. The magnitude of the geometric mean approximately equates to bankfull discharge, on the average. Relations depicting hydraulic characteristics of a discharge equal to the geometric mean of annual peak flows may therefore be considered generally to be representative of channel conditions existing during bankfull discharge. The relations have application for predicting channel response to developments that would alter streamflow.

Dye-tracer studies were made of six streams in the study area, and velocity relations from these studies were compared to the at-a-station velocity relations. The relations generally are similar. Where the relations are not similar, the differences are attributed to: (1) The gaged reach not being representative of adjacent reaches where dye studies were made, or (2) inaccuracies in the dye-velocity computation in a determined stream distance because the path of travel for low flows is longer than for high flows.

ABSTRACT

Accession Number:
@ 532.1
Lowham, H.W., 1981, Water and its relations to economic development in the Green River and Great Divide basins in Wyoming: project summary in Water-resources investigations of the U.S. Geological Survey in Wyoming, Fiscal Year 1980, Open-File Rep. 81-81-20;, p. 70-73.

Contact: Hugh Lowham (status)

Key Categories: WYOMING, SURFACE WATER QUALITY, SURFACE WATER QUANTITY,GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

Existing water data was compiled and evaluated. A literature search for present hydrologic knowledge of the area was conducted. Regarding water quality, particular attention will be given to trace metals, biological parameters, and trend analyses. Channel-geometry techniques, Landsat satellite imagery, and detailed statistical analyses were applied to surface-water studies. Aquifer tests and bore-hole and surface geophysical surveys will be used in groundwater studies. Digital models were developed for chemical-quality and surface-water systems.

Several reports have been published under this project (Abstract Nos. 133, 532, 534, 535, 536) and others are planned.

ABSTRACT

Accession Number:
@ 533
Lowham, H.W., 1978, An analysis of stream temperatures, Green River basin, Wyoming: U.S. Geological Survey Water-Resources Investigations 78-13, 41 p.

Contact: Public Inquiries Office (copy)

Key Categories: WYOMING, SURFACE WATER QUALITY

Access Code: 011 Use Code: 01

This report presents a method for estimating temperatures of streams in the Green River Basin, Wyoming. The procedure utilizes a regional model for estimating mean daily temperatures of streams at unmeasured sites. The regional model was developed by describing annual temperature patterns at 43 measured sites in the basin and by applying the harmonic function

$$T = M + A [\sin (0.0172 t + C)]$$

where T is mean daily temperature,
M, A, and C are harmonic coefficients calculated from data for each stream-temperature station, and
t is the day of the water year.

Application of the above equation for estimating temperatures at unmeasured sites requires regionalized estimates of the coefficients M, A, and C. Regional estimates were developed with the aid of multiple-regression techniques. Harmonic coefficients calculated from measured station data were regressed against physical and climatic characteristics of the stream-temperature stations. The harmonic mean (M) was found to be related to stream elevation (E): $M = 19.5 - 0.0019 E$. Useable regression equations could not be developed for describing regional values of harmonic amplitude (A) and phase coefficient (C). However, station values of A were found to have certain areal patterns, and a map showing regional values was developed for estimating A at unmonitored sites. Variation in station values of C was small (range 2.47 to 3.36 radians), and an average value of 2.68 radians is used for estimating C at unmeasured sites. Examples are presented for utilizing the model to estimate temperatures at unmeasured sites.

Analysis of areal and temporal variations in temperature showed that springs, irrigation return flows, and reservoir storage were affecting reaches of several major streams.

ABSTRACT

Accession Number:
@ 534
Lowham, H.W., 1976, Techniques for estimating flow characteristics of Wyoming streams: U.S. Geological Survey Water-Resources Investigation 76-112, 83 p.

Contact: Public Inquiries Office (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 01

This report presents relations for estimating peak flows and mean annual flow for natural streams in Wyoming. Two separate techniques for estimating flow characteristics are presented: 1) The channel-geometry method, whereby flow characteristics are related to channel dimensions; and 2) the basin-characteristics method, whereby flow characteristics are related to physiographic and climatic features of the drainage basin.

Development of the channel-geometry method showed channel width to be the most significant channel dimension for estimating flow characteristics. Use of this method requires that a field measurement be made of channel width.

Development of the basin-characteristics method showed drainage-area size to be the most significant basin feature for estimating streamflow. In the mountainous areas, basin elevation also affects streamflow. Because these basin features can be determined from maps, this method does not require a field visit to the site.

ABSTRACT

Accession Number:
@ 535
Lowham, H.W., DeLong, L.L., Collier, K.R., and Zimmerman, E.A., 1980,
Hydrology of Salt Wells Creek--a plains stream in southwestern
Wyoming: U.S. Geological Survey Water-Resources Investigations,
91 p.

Contact: Public Inquiries Office (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SEDIMENT

Access Code: 152 Use Code: 01

This report summarizes results of a hydrologic study made during 1975-78 on Salt Wells Creek, a drainage area of about 500 square miles located southeast of Rock Springs, Wyoming. The area is typical of arid and semiarid plains areas in southwestern Wyoming where mineral development is occurring.

Salt Wells Creek is predominately an intermittent stream. Numerous springs in the headwaters cause small perennial flows in some upstream tributaries, but evaporation, freezeup, and seepage deplete these flows so that the middle and lower reaches of the main channel have only intermittent flows. The intermittent nature of streamflow affects water quality. It was observed that a flushing of dissolved solids and suspended sedimen occurs during the first flows of a runoff event.

A striking feature of the stream is its deeply incised channel. The downcutting is attributed to the cummulative effects of (1) change in climate, (2) change in base level due to downstream channelization, and (3) changes in land use. Because of the incision erosion is now expanding to include intervening tributaries.

ABSTRACT

Accession Number:
@ 536
Lowham, H.W., DeLong, L.L., Peter, K.D., Wangsness, D.J., Head, W.J, and Ringen, B.H., 1976, A plan for study of water and its relation to economic development in the Green River and Great Divide basins in Wyoming: U.S. Geological Survey Open-File Report 76-349, 92 p.

Contact: Open-File Services Section (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY, SURFACE WATER QUALITY

Access Code: 011 Use Code: 03

The U.S. Geological Survey is conducting a study of water resources in the Green River and the Great Divide basins. The study began in November 1974 and continued through 1979. This report summmarizes the study plan and discusses particular methods of approach that would be utilized in the study. The principal objectives of the study are: 1) To describe the water resources and hydrologic relations that presently exist; 2) to develop predictive methods that can be used to describe future conditions, including reactions to increased water development; and 3) to establish monitoring programs for detecting possible changes in water conditions.

This report presents: 1) objectives of the study; 2) a general description of the study area, including its mineral and water resources; 3) a summary of existing data and knowledge of the water resources of the area; 4) a detailed description of the study plan; and 5) a schedule of reports to be prepared by the study group.

ABSTRACT

Accession Number:
@ 537
Lowham, H.W., Kircher, J.E., and Boner, F.C. ,1978, Temperatures of Wyoming streams: Wyoming Water Planning Program Report No. 15, Prepared by the U.S. Geological Survey, Cheyenne, Wyoming, 115 p.

Contact: Hugh Lowham (copy)

Key Categories: SURFACE WATER QUALITY, WYOMING

Access Code: 011 Use Code: 01

Beginning in about 1950, observations of water temperature were obtained whenever discharge measurements were made by the U. S. Geological Survey. Most of these temperature observations have never been published. The purpose of this report is to present these previously unpublished data from the time observations began through the 1973 water year. The data are presented in graphical form for 207 streamflow stations.

Data presented in this report were collected in cooperation with the Wyoming State Engineer; Wyoming Department of Economic Planning and Development; Wyoming Game and Fish Commission; Wheatland Irrigation District; City of Rawlins; City of Cheyenne; town of Jackson; Bureau of Reclamation and Bureau of Land Management, U.S. Department of the Interior; Soil Conservation Service, Department of Agriculture; and the Corps of Engineers, U.S. Army.

ABSTRACT

Accession Number:
@ 538
Lundberg, D., and Spradlin, H.K.L., 1981, Meteorological and climatological investigation - review of January-June 1980 investigative period: Laramie Energy Technology Center Report LETC-10787-80.

Contact: Ed Mead (loan)

Key Categories: UTAH, CLIMATE

Access Code: 202 Use Code: 01

Since January 1979, a meteorological and climatological investigation for the purpose of establishing a microclimatic baseline has been continuously conducted at the Geokinetics oil shale research facility in Eastern Utah. This report, however, presents the findings for only a six month segment (January 1 - June 30, 1980) of that ongoing investigation. Included in this report is a description of the program design, the handling and interpretation of the data, and program improvement considerations recommended for inclusion into future segments of the investigation. The research discussed herein was conducted with the partial assistance of the United States Department of Energy under contract number DE-FC20-78LC10787.

ABSTRACT

Accession Number:
@ 539
Maase, D.L., 1980, An evaluation of polycyclic aromatic hydrocarbons from processed oil shales: Ph.D. Dissertation, Utah State University, Logan, Utah, 190 p.

Contact: University Microfilms International (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 02

This thesis presents the results of a laboratory study to characterize the organic residue associated with spent shale. The study focused on polycyclic aromatic hydrocarbons (PAHs). Spent shale samples from the Union B, Paraho, and TOSCO II processes were extracted using organic solvents in a Soxhlet apparatus and by mixing shale samples with water (leachates).

More than 100 organic compounds from processed oil shales were identified by gas chromatography coupled with mass spectrometry (GC/MS). Four and five ring PAH (fluoranthrene, pyrene, triphenylene, benz(a)anthracene, chrysene, benzo(e)pyrene, perylene and benzo(a)pyrene) were found to be benzene extractable from processed shales in concentrations ranging from 1 to 50 ppb (weight of each PAH:weight shale). These PAH were present in water extracts at concentrations below their respective solubilities.

ABSTRACT

Accession Number:
@ 540
Maase, D.L., Adams, V.D., Porcella, D.B., and Sorensen, D.L., June 1980, Isolation and identification of organic residues from processed oil shale: in Gale, C., ed., Oil shale symposium: sampling, analysis and quality assurance, Rep. EPA-600/9-80-022, p. 363.

Contact: Ed Bates (copy)

Key Categories: LEACHING, SURFACE,

Access Code: 011 Use Code: 03

The purpose of this study was to identify characteristics of organic residue from processed oil shale. Processed oil shale samples from the Union B, Paraho and TOSCO II processes have been extracted by using organic solvents in a soxhlet apparatus and by mixing shale samples with water. Sample extraction residues were identified by gas chromatography coupled with mass spectrometry (GC/MS).

ABSTRACT

Accession Number:
@ 541
Madison, R.J., 1970, Water-quality data for the Flaming Gorge Reservoir area, Utah and Wyoming: U.S. Geological Survey Open-File Report (duplicated as Utah Basic-Data Release 20), 33 p.

Contact: USGS - Salt Lake City (copy)

Key Categories: SURFACE WATER QUALITY, WYOMING

Access Code: 011 Use Code: 01

In October 1966, the U.S. Geological Survey began a reconnaissance study of water quality in Flaming Gorge Reservoir. The purpose of this study was to determine the load of dissolved ions in the reservoir, the changes in chemical quality of the water as a result of initial leaching and subsequent storage, and the effect of the reservoir on the effluent waters. The construction of Flaming Gorge Dam began in 1957, and the reservoir began storing water in November 1962. This report tabulates the chemical-quality data which were collected during the study (1966-68) and summarizes some of the data available prior to closure of the reservoir. Three sets of data were collected from the reservoir during the study. At each site in the reservoir, samples were collected at various depths from the surface to the bottom. For sites 1-6, the sampling verticals were at the deepest part of the reservoir cross section. For sites 7-12, in the upper reaches of the reservoir, sampling verticals were at three points in the cross section. Samples for complete chemical analysis were collected from sites 1-6 at both the beginning (October 1966) and the end (September 1968) of the data-collection phase of the study. Samples for partial analysis were collected from sites 1 and 6-13 in September 1967. Chemical-quality and water-discharge data were also collected from most of the minor tributaries to the reservoir during the summer and fall of 1967.

Measurements are reported for SiO_2, Ca, Mg, Na, K, HCO_3, CO_3, SO_4, Cl, F, No_3, B, pH, and others. Graphs showing variations of various constituents with depth through the reservoir are also presented.

ABSTRACT

Accession Number:
@ 542
Madison, R.J., and Waddell, K.M., 1973, Chemical quality of surface water in the Flaming Gorge Reservoir area, Wyoming and Utah: U.S. Geological Survey Water-Supply Paper 2009-C, 18 p., plus 1 plate.

Contact: Public Inquiries Office (copy)

Key Categories: SURFACE WATER QUALITY, WYOMING, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 01

This is an interpretative report based on the data reported in Madison, 1970 (Abstract No. 541). The purpose of this report is to evaluate the effects on water quality of impoundment by Flaming Gorge Reservoir. Storage of water began in November 1962, and a reconnaissance study was made during the period 1966-68 to determine the effects of the reservoir on the chemical quality of the effluent water and to describe the quality of the impounded water and inflowing water.

This report reviews the reconnaissance program and summarizes the water quality of reservoir contents and inflow. The effects of the reservoir on water quality and flow of the Green River are discussed. A plate summarizes the distribution of dissolved solids and chemical composition of water in the reservoir. The composition and concentration of dissolved solids and dissolved load are discussed.

This investigation revealed a substantial increase in average concentration of dissolved solids in the Green River below Flaming Gorge Reservoir for the first six years after closure. Most of this increase is the result of the leaching of soluble minerals from the inundated areas, and leaching appeared to be measurably increasing the load of dissolved solids in the river system near the end of the six-year period.

ABSTRACT

Accession Number:
@ 543
Major, T.J., Kerbs, L., and Penley, R.D., 1975, Water-level records for Colorado, 1971-75: Colorado Water Resources Basic-Data Release No. 37, U.S. Geological Survey, Denver, Colorado, Colorado Dept. of Natural Resurces, and other agencies, 356 p.

Contact: Lucy Laughlin (copy)
USGS Library (loan)

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

This report presents water-level measurements made prior to the irrigation season in 1975. Measurements from 1971-74 were made at the same time of year and are included to serve as references illustrating declining or rising water levels. The number of wells that were measured was dependent, partly, on the size of the aquifer and on the intensity of ground-water use.

West of the Continental Divide, where ground-water withdrawal is low, the water-level fluctuations reflect mostly changes in natural conditions. East of the Continental Divide, because of substantial utilization of ground water by man, the major fluctuations are caused by artificial withdrawal. Hydrographs and water-level change maps are included in this report to illustrate responses to natural and manmade stresses on the aquifer.

ABSTRACT

Accession Number:
@ 544
Major, T.J., Kerbs, L., and Penley, R.D., 1974, Selected water-level records for Colorado, 1971-75: Colorado Water Conservation Board Water-Resources Basic-Data Release 34, 104 p.

Contact: USGS Library (loan)

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 02

This report presents water-level measurements made prior to the irrigation season in 1975. Measurements from 1971-74 were made at the same time of year and are included to serve as references illustrating declining or rising water levels. The number of wells that were measured was dependent, partly, on the size of the aquifer and on the intensity of ground-water use.

West of the Continental Divide, where ground-water withdrawal is low, the water-level fluctuations reflect mostly changes in natural conditions. East of the Continental Divide, because of substantial utilization of ground water by man, the major fluctuations are caused by artificial withdrawal. Hydrographs and water-level change maps are included in this report to illustrate responses to natural and manmade stresses on the aquifer.

ABSTRACT

Accession Number:
@ 544.1
Malek, A., 1981, Hydrologic aspects of water harvesting on processed oil shale, a saline medium: Ph.D. Dissertation, Utah State University, Logan, Utah, 205 p.

Contact: University Microfilms International (copy)

Key Categories: LEACHING, SURFACE, RECLAMATION

Access Code: 011 Use Code: 02

During 1978, a study was conducted both in the field and the laboratory to investigate the hydrologic characteristics of Paraho spent shale. Research focused on the possibility of applying water harvesting techniques to supply additional water to supplement natural precipitation for establishing plants on a spent shale pile for rehabilitation. In both field and laboratory experiments, four types of soil stabilizing materials were tested for their efficiency to harvest water.

Results of sediment production analysis showed that Paraho spent shale has a high erodibility potential. Excessive sediment concentration in harvested water collected from most plots was a major problem for water quality. However, some of the treatments, such as paraffin and mulch, proved to be effective in reducing and controlling sediment production. Both field and laboratory experiments (with leaching columns) showed that processed shale is highly saline. The EC of the first few samples of both leachate and harvested water from most treatments was higher than 30-40 mmhos/cm. However, in all cases electrical conductivity sharply decreased with the application of more water.

ABSTRACT

Accession Number:
@ 544.2
Malekuti, A., and Gifford, G.F., Feb. 1978, Natural vegetation as a source of diffuse salt within the Colorado River basin: Water Resources Bulletin, v. 14, n. 1, p. 195-205.

Contact: Denver Public Library (loan)

Key Categories: UTAH, SALINITY

Access Code: 002 Use Code: 02

Foliage and litter leachate from selected natural vegetation in the Price River Basin (within the Upper Colorado River Basin) was studied to determine the probable impact of plants on the amount of diffuse salt movement from rangeland watersheds. Calculations using concentrations of various leachates and characteristics of range sites expected to be high salt producers indicated that plants contribute between 0.01 and 0.02% or less of the total annual salt load to the Price River. It was concluded that plants are not a significant source of diffuse salt within the Colorado River Basin.

ABSTRACT

Accession Number:
@ 545
Maletic, J.T., 1974, Current approaches and alternatives to salinity management in the Colorado River basin: in Proceedings of the 15th Annual Western Resources Conference, July 1973, University of Colorado, Boulder, Merriman Publishing Co., Boulder, p. 11-29.

Contact: University of Colorado Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 002 Use Code: 03

Approaches currently being incorporated into plans for dealing with the salinity problem in the Colorado River Basin are summarized. Salinity control in the Colorado River Basin, when integrated into an over-all basin management plan, can prevent the costly increases in salinity anticipated from continuing economic growth in the basin. To be implementable, the plan will need to be socially, politically, economically, and ecologically acceptable as well as physically sound. In the Colorado River system, the basin management concept provides a more viable approach to salinity control than singular application of the complete water reuse concept.

ABSTRACT

Accession Number:
@ 545.1
Mallory, E.C., Jr., and Barnett, P.R., June 1973, Chemical and spectrochemical analyses of selected groundwater in Colorado: U.S. Geological Survey Open-File Report, 47 p.

Contact: Open File Service Service (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY, SPRINGS

Access Code: 002 Use Code: 03

Chemical and spectrographic analyses are presented for 44 saline and 48 fresh samples of groundwater from wells and springs in Colorado. Thirty-two of the samples were from thermal springs. The samples were collected during 1967-69, many from the same sources sampled in 1911 and 1912 in order to compare analytical data. Samples were collected and analyzed by the U.S. Geological Survey employing both conventional wet analytical and emission spectrographic techniques. Emission spectrographic analyses yielded determinations of elements not reported in the early studies, and modern instruments and methods in general make possible more accurate and sensitive chemcial analyses. Comparison of 1967-69 with 1911-12 measurements of water temperature for selected spring water and groundwater showed little difference. Dissolved solids of 1967-69 water samples appeared to be slightly lower than those reported of 1911-12 samples, but this difference may be largely due to different methods of analysis. Some water contained arsenic, cadmium, iron, manganese, sulfate, chloride, and fluoride in concentrations that equalled or exceeded standards adopted by the U.S. Public Health Service for drinking water.

ABSTRACT

Accession Number:
@ 546
Manahan, S.E., Poulson, R.E., Green, J.B., and Farrier, D.S.,
Sept. 1978, Coal humic substances and their application to pollution control in the synthetic fuels industry: Laramie Energy Technology Center, Rep. LETC/RI-78/5, 35 p.

Contact: Dick Poulson (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 03

Coal humic acid is a fraction of coal humic substances prepared by the partial oxidation of coal and has a number of properties that make it attractive as a material to treat pollutants in water, stack gas, and other pollutant sources.

The first section of this paper is a review of humic substances in general, coal humic substances in particular, and the uses of coal humic substances for wastewater treatment.

The second section of this work describes the preparation and properties of coal humic substances and their application to in-situ oil shale wastewater treatment. The removal of organic pollutants labelled with carbon - 14 from omega - 9 oil shale retort water by treatment with lime and lime plus coal humic acid was studied. In general, the removal of organic compounds is enhanced by the addition of coal humic acid. The lowest removal was zero for removal of benzoic acid by lime treatment, alone, (3.99% removal in the presence of coal humic substance). The highest removal efficiency was 99.2 removal of benz(a)pyrene with lime plus coal humic acid (97.5% with lime, alone).

ABSTRACT

Accession Number:
@ 547
Mankowski. S.G., June 1979, Investigation of the Geokinetics horizontal in situ oil shale retorting process: quarterly report, Jan. - March, 1979: Rep. LETC-10787-28.

Contact: Ed Mead (loan)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 03

This is a quarterly progress report covering the period January through March, 1979 under the U.S. DOE cooperative agreement with Geokinetics. Appendix D of this report presents preliminary groundwater quality and retort water quality analyses. Highs, lows, means, standard deviations, and variance for native groundwaters and Geokinetics retort water are presented for over 50 parameters.

ABSTRACT

Accession Number:
@ 547.1
Mankowski, S.G., March 1979, Investigation of the Geokinetics horizontal in situ oil shale retorting process: quarterly report, Oct. - Dec. 1978: U.S. DOE Rep. LETC-10787-23, 27 p. plus appendices.

Contact: NTIS (copy)
Neil Young (loan)

Key Categories: UTAH, GROUNDWATER QUALITY, EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

This quarterly progress report covers the period October through December, 1978 under the U.S. DOE cooperative agreement with Geokinetics. Appendices A and B of this report summarize the result of hydrologic and water resources investigations at the Geokinetics experimental site in Uintah County, Utah. This program consists of chemical analysis of groundwaters and surface runoff waters from areas proximate to in-situ retorts and of investigations of the movement of groundwaters through abandoned in-situ retorts. The report discusses and interprets the data. The raw data are tabulated at the end of the report.

ABSTRACT

Accession Number:
@ 547.2
Mankowski, S.G., and Hutchinson, D.L., Nov. 1979, Investigation of the Geokinetics horizontal in-situ oil shale retorting process: quarterly report, July to Sept. 1979: U.S. DOE Rep. LETC-10787-35, 28 p. plus appendices.

Contact: NTIS (copy)
Neil Young (loan)

Key Categories: UTAH, CLIMATE

Access Code: 002 Use Code: 01

This quarterly progress report covers the period July-September 1979 under the U.S. DOE cooperative agreement with Geokinetics. Appendix A summarizes the results of meteorological and climatological studies at the Geokinetics site from January 1 through June 30, 1979. The report presents tables that summarize maximum and minimum temperatures, daily mean temperatures, composite profiles, wind roses, wind speed direction by hour, temperature (100-10 ft) by hour, and lapse rate (100-30 ft) by hour.

ABSTRACT

Accession Number:
@ 547.3
Mann, D.E., 1976, Water policy and decision making in the Colorado River Basin: Lake Powell Research Bulletin No. 24.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, WATER LAW

Access Code: 000 Use Code:

The purpose of this Bulletin is to address how the Basin States approach decision-making on water policy matters within the context of more general and sometimes overriding policy issues. It will also examine the extent to which traditional patterns of decision-making may be changing in the light of new policy considerations as they affect the region. It should be stated at the outset that the picture is a complicated one because of the swiftly moving events and the true ambivalence many people feel with respect to given policies.

ABSTRACT

Accession Number:
@ 548
Mann, D.E , 1975, Conflict and coalition: political variables underlying water resource development in the Upper Colorado River basin: Natural Resources Journal, v. 15, n. 1, p. 141-169.

Contact: Denber Public Library (loan)

Key Categories: UTAH, WATER LAW

Access Code: 002 Use Code: 03

Upper Colorado River Basin development is characterized as a reflection of distributive and regulative politics. Examination of the history of bargaining between interests in Colorado, Utah, New Mexico, and Wyoming and of the passage of the proposals shows the impact of the political distributive framework, except when certain conservation or interregional issues are raised. The proposed dam at Echo Park in Dinosaur National Monument caused a major struggle with conservation groups and brought the Colorado Basin projects into the arena of regulatory politics. Despite this occasional shift, the Colorado River projects and water politics in general, continue to follow distributive politics thereby avoiding a critical examination of overall costs and benefits as well as possible alternatives.

ABSTRACT

Accession Number:
@ 549
Mann, D.E., Jan. 1975, Politics in the United States and the salinity problem of the Colorado River: Natural Resources Journal, v. 15, no. 1, p. 113-128.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, WATER LAW

Access Code: 002 Use Code: 03

Water policy-making in the United States is 'distributive' in character and has been carried out pursuant to traditional modes of political decision-making. When dealing with the salinity problem of the Colorado River, experience confirms the traditional mode of political behavior. The salinity control program will be largely a federal program carried out by the Bureau of Reclamation, largely financed by federal taxes and monitored by federal agencies. State and regional involvement is ensured by a strong local or regional coalition. This approach to the salinity problem promises extensive benefits to traditional beneficiaries with very little cost. Intraregional trade-offs of costs and benefits are ignored, leaving the general taxpayer to pay the bill.

ABSTRACT

Accession Number:
@ 550
Mann, D.E. Weatherford, G.D., and Nichols P., Sept. 1974,
Legal-political history of water resources development in the Upper Colorado River basin: Lake Powell Research Project Bulletin no. 4, 53 p.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, WATER LAW

Access Code: 002 Use Code: 03

The first part of this study is a descriptive summary of the legal history surrounding passage of the Colorado River storage project act of 1956, while the second part approaches those historical events analytically from the perspective of political science. The major political and legal decisions emanating from the Colorado River compact of 1922 and resulting in the 1956 act are identified. Five general themes are evident in history: (1) the developmental needs of the upper basin, (2) the legal constraints of the 1922 compact, (3) the economic wisdom of the Colorado River storage project, (4) the conservation value of Dinosaur Monument, and (5) the engineering feasibility and geologic effects of the project. The dynamics of the political bargaining, including the nature of some of the major tradeoffs are described. The persistence of distributive politics, in the face of increasing pressure for a more regulatory mode of decision-making, is discussed in the context of some of the current problems such as water quality of the river. Finally, several unresolved issues of public policy concerning Colorado River management are posed.

ABSTRACT

Accession Number:
@ 559

Marcus, M.D., and Bergman, H.L., 1980, Bibliography of aquatic ecosystem effects, analytical methods and treatment technologies for organic compounds in advanced fossil-fuel processing effluents: Duluth, Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency.

Contact: U.S. Environmental Protection Agency (copy)

Key Categories: BIBLIOGRAPHY

Access Code: 032 Use Code: 03

Advance fossil-fuel processing operations, including oil-shale retorting, coal gasification, coal liquifaction and tar-sands recovery, can result in chemically complex aqueous waste effluents. This bibliography compiles much of the recent literature (ca. 1970-1977) concerning effects of organic compounds in advanced fossil-fuel processing effluents when discharged into aquatic ecosystems, plus information available on analytical methods and treatment technologies for these organics. To compile the bibliography, nearly 500 organic compounds known to be constituents of fossil fuels and fossil-fuel processing effluents were crossed with a list of key words during a computerized search of six bibliographic data bases. The bibliography contains 1314 citations which are indexed by chemicals, key words, taxonomic categories and authors. This bibliography is intended especially for researchers working with advanced fossil-fuel processing effluents in aquatic environments, but may also be useful to those concerned with fossil-fuel processing effluents in terrestrial environments and to those working in pulp mill and pesticide research.

ABSTRACT

Accession Number:
@ 560
Marcus, M.D., and Bergman, H.L., Stoller, D.A., Brown, S.K., and Molholt, P.A., 1980, Bibliography of aquatic ecosystem effects, analytical methods and treatment technologies for organic compounds in advanced fossil-fuel processing effluents: Rep. EPA-600/3-80-026.

Contact: NTIS (copy)

Key Categories: BIBLIOGRAPHY, EFFLUENTS, SURFACE, IN-SITU, ENVIRONMENTAL

Access Code: 002 Use Code: 02

This is Volume 2 of a bibliography on aquatic ecosystem effects, analytical methods and treatment technologies for organic compounds. Citations are included on terrestrial effects, advanced fossil fuel technologies, and on effluents from other sources. Volume 1 is abstracted elsewhere. This second volume contains an additional 1135 citations indexed by author, keyword, chemical and taxonomic categories. The additional information in this volume was obtained from both computerized searches and manual searches. These citations are available on a computer system at the University of Wyoming and may be accessed by contacting Harold Bergman (307) 766-4430.

ABSTRACT

Accession Number:
@ 561
Margheim, G., 1975, Water pollution from spent oil shale: Ph.D. Dissertation, Colorado State University, Fort Collins, 132 p.

Contact: University Microfilms International (copy)

Key Categories: LEACHING, SURFACE, COMPUTER MODELS

Access Code: 011 Use Code: 01

Physical properties, including porosity, permeability, particle size distribution, and density of spent oil shale from three different retorting operations, The Oil Shale Corporation, U.S. Bureau of Mines and Union Oil Company (TOSCO, USBM, and UOC) have been determined. Slurry experiments were conducted on each of the spent oil shale residues and the slurry analyzed for leachable dissolved solids. Percolation experiments were conducted on the TOSCO spent shale residue and the quantities of dissolved solids leachable determined. The major constituents SO_4^{--} and Na^+, were present in concentrations of 90,000 and 35,000 mg/l respectively in the initial leachate; however, the succeeding concentrations dropped markedly during the course of the experiment. A computer program was developed and utilized to predict equilibrium concentrations in the leachate from the percolation experiment.

The extent of leaching and erosion of spent oil shale and the composition and concentration of dissolved solids in natural runoff from spent oil shale was determined from pilot studies using simulated rainfall. Concentration of total dissolved solids in the surface runoff was correlated with runoff rate, precipitation intensity, flow depth, application time, slope, and water temperature.

A soil mechanics study was conducted to determine moisture-density relationships and saturated shear strength parameters for the TOSCO spent shale residue. The results of this study can be used to help estimate the stability of spent shale residue piles.

ABSTRACT

Accession Number:
@ 562
Markley, D.E., Munson, S.D., and Dougan, P.M., 1980, Geohydrology and surface water hydrology programs of the Equity/DOE BX in situ oil shale project, Rio Blanco County, Colorado: in Proceedings of the 13th Oil Shale Symposium, Colorado School of Mines Press, Golden, Colorado, p. 376-384

Contact: Colorado School of Mines (copy)

Key Categories: SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, COLORADO

Access Code: 011 Use Code: 01

This paper summarizes the results of the geohydrologic testing program of the Equity/BX in situ oil shale project located in Rio Blanco county in Colorado. The surface water monitoring program is also briefly described. The paper summarizes the results of single-well geohydrologic testing and analysis of the isotropic properties of the upper aquifers and of in-situ of geohydrologic testing and analysis to determine the three-dimensional anisotropic properties of the leached zone. The transmissivity, permeability, and storage coefficients of the intervals tested are summarized.

ABSTRACT

Accession Number:
@ 563
Marlatt, W.E., 1973, Climatology of the Morrisania Mesa-Battlement Mesa - Colorado River Valley of Western Colorado: report prepared for Colony Development Operation by Marlatt and Associates, 73 p.

Contact: BLM-Vernal (loan)
BLM-Craig (loan)

Key Categories: CLIMATE, COLORADO

Access Code: 011 Use Code: 02

A short, intensive study was made to evaluate the climatology of the mesa areas to the south of Grand Valley, Colorado. Although there was an extremely sparse amount of data available on the climate of the local area, determination of statistical relationship between stations located along Morrisania Road and the National Weather Service station in Rifle, Colorado permitted the generation of extreme value probabilities of air temperature and annual march of degree days necessary for land use planning.

Air temperature measurements obtained from hygrothermographs located at different elevations along Morrisania Mesa during March through May, 1972 were used to estimate the stability of the lower atmosphere in the valley. Measurements to obtain spatial distribution of air temperature, wind, and surface temperature were obtained during the period June 30 through July 9, 1973. These were used to evaluate certain microclimatic phenomena.

ABSTRACT

Accession Number:
@ 564

Marsell, R.E., 1964, Geomorphology of the Uinta Basin--a brief sketch: in Guidebook to the geology and mineral resources of the Uintah Basin, Intermountain Association of Petroleum Geologists, Thirteenth Annual Field Conference, Sept. 16-19, 1964, p. 29.

Contact: none

Key Categories: CLIMATE, UTAH

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 565
Maxwell, J.D., Bridges, B.L., Barker, D.A., and Moore, L.G., 1971, Hydrogeology of the eastern portion of the south slopes of the Uinta Mountains, Utah: Utah Department of Natural Resources, Information Bulletin 21, 54 p.

Contact: Utah Division of Water Rights (copy)

Key Categories: UTAH, SPRINGS, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

This report reviews and describes studies conducted to determine the relationship of major sinks to large springs in the eastern portion of the south slopes of the Uinta Mountains. Some streams which drain the southern slopes of these mountains flow over or into sink areas where part or all of the streamflow is lost to the underground. These losses supply large springs which emerge several miles downstream from the sink areas. This report reviews investigations of this phenomenon through 1967, and it describes in some detail cooperative studies of the Soil Conservation Service, U.S. Bureau of Reclamation, and the Uintah Water Conservance District, assisted by the U.S. Geological Survey, to understand the relationship between these sinks and springs.

This report overviews the geology and hydrostratigraphy of the area, and it describes groundwater movement. The geology and hydrology of sinks, caverns and springs in the area are described. Two major field studies - hydrologic investigations and groundwater tracing studies - are described in detail. The purpose of the hydrologic investigations was to provide an estimate of the quantity of water flowing through the valley alluvium of Dry Fork. This was accomplished through pumping tests, field reconnaissances, and analyses of USGS streamflow records. Hydrographs for Dry Fork above Sinks, Ashley Spring, Brush Creek near Vernal, Dry Fork below Spring, and Ashley Creek above Spring are presented for 1944, 1945 and 1954-56. Inflow-outflow studies are presented for several areas. In the tracer studies, dye was injected into streams above the sink areas and looked for in springs.

ABSTRACT

Accession Number:
@ 566
McCain, J.F., and Ebling, J.L., 1979, A plan for study of flood hydrology of foothill streams in Colorado: U.S. Geological Survey Open-File Report 79-1276, 29 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, FLOODS, CLIMATE

Access Code: 002 Use Code: 02

A comprehensive plan is presented for researching methods of flood-data analysis and information transfer for foothill areas, and for establishing a hydrologic data-collection network in the foothill areas of Colorado. The research will concentrate on three areas:

1. Developing methods to analyze flood peaks in foothill areas by using gaging-station records to obtain annual arrays of snowmelt and rainfall peaks.
2. Investigating techniques for flood information transfer, using physical and climatic characteristics.
3. Testing and, if required, verifying hydrologic models.

The available gaging-station data consists of records from 81 active and 43 discontinued gaging stations. The National Weather Service operates 53 recording and 70 nonrecording precipitation gages, and has 476 storm observers within the project boundaries. The Soil Conservation Service is installing a network (SNOTEL) of 46 automated snowpack monitors. A data-collection network will be established in areas of data deficiencies, consisting of streamflow stations, crest-stage gages, and precipitation stations.

ABSTRACT

Accession Number:
@ 566.1
McCain, J.F., and Jarrett, R.D., 1976, Manual for estimating flood characteristics of natural-flow streams in Colorado: Colorado Water Conservation Board Technical Manual no. 1, 68 p.

Contact: Colorado Water Conservation Board (loan)

Key Categories: COLORADO, FLOODS

Access Code: 002 Use Code: 02

This manual contains methods for obtaining flood information for the 10-, 50-, 100-, and 500-year floods at sites on natural-flow streams in Colorado. This flood information should be useful in land-use planning, flood insurance studies, and other studies requiring flood-frequency information. The peak-discharge information is applicable to a wide variety of studies ranging from rapid approximation of flood-prone areas to detailed flood-plain studies based on precise hydraulic field measurements. Conversely, the flood-depth information is applicable only for rapid approximation of flood-prone areas or as a general guide to flood depths for comparative purposes. This limited usage of the flood-depth information results from the difficulty in evaluating field conditions, such as channel width, and size of structures, such as bridges and culverts, from existing topographic maps.

The limitations of the methods are discussed first to caution the user of their range of applicability. Next, the methods are described and a step-by-step procedure for applying the methods is presented with several examples. Procedures for transferring the depth information to topographic maps are also described. Other sections contain a discussion of accuracy, analytical development of the methods, and a list of flood data for gaging stations.

ABSTRACT

Accession Number:
@ 567
McCall-Ellingson & Morrill, Inc., April 1974, Water quality
management plan for the Green River Basin.

Contact: BLM - Craig (loan)

Key Categories: WYOMING, ENVIRONMENTAL

Access Code: 102 Use Code: 03

This report has been prepared in fulfillment of a contract for the preparation of a Water Quality Management Plan for the Green River hydrologic basin in Colorado.

The purpose of the plan is to provide an assessment of the existing water quality of the basin and to provide a planning guide for future water quality control to meet requirements of the Federal Water Pollution Control Act of 1972.

Modelling based on empirical values was done for a segment of the Yampa River just below Steamboat Springs, that receives the highest pollution loading in the basin. This was the basis of the effluent load allocations made by the Routt County Regional Planning Commission. The reaction coefficients which form the basis of this modelling work are believed to be representative, but the model should be verified by additional intensive stream sampling.

ABSTRACT

Accession Number:
@ 568
McConaghy, J.A., and Colburn, G.W., 1964, Records of wells in Colorado: Colorado Water Conservation Board Basic-Data Release No. 17, 384 p.

Contact: USGS Library (loan)

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 02

This release is a compilation of water-well data on file in the Colorado State Engineer's Office. These data were submitted in compliance with the State of Colorado ground-water law which became effective on May 1, 1957. Data are included concerning the owner of the well, a description of the well, and reference to registration of the well. The permit number may be used to locate the driller's report in the State Engineer's Office. The driller's report contains a geologic log and other data not included in this report.

ABSTRACT

Accession Number:
@ 566.1
McCuen, R.H., Rawls, W.J., and Whaley, B.L., Aug. 1979, Comparative evaluation of statistical method for water supply forecasting: Water Resources Bulletin, v. 15, n. 4, p. 935-947.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS

Access Code: 002 Use Code: 02

While the correlation coefficient and standard error of estimate are frequently used when comparing models of seasonal water yeild, the following criteria may be more important in selecting one model from among several alternatives: rationality of the regression coefficients, the distribution of the residual errors, and the correctness of indicators of the relative importance of the predictor variables. These criteria were used to compare seasonal water yield models. Hydrologic data from the Upper Sevier River basin in Southern Utah were used to illustrate the comparative analysis process. The prediction equations used the April-July streamflow volume as the criterion variable.

ABSTRACT

Accession Number:
@ 568.2
McDermott, W.F., March 1980, Occidental vertical modified in-situ process for the recovery of oil from oil shale, Phase II, quarterly progress report, Dec. 1, 1979 - Feb. 29, 1980: U.S. DOE Rep. DOE/LC/10036-T3, 263 p.

Contact: NTIS (copy)
LETC Library (loan)

Key Categories: COLORADO, CLIMATE, GROUNDWATER QUALITY, SURFACE WATER QUALITY, EFFLUENTS, IN-SITU

Access Code: 002 Use Code: 02

This is a quarterly progress report that covers the period December 1, 1979 through February 29, 1980 under the scope of work for Phase II of the DOE/Occidental Oil Shale Cooperative Agreement. Appendices to this report summarize environmental data from the Logan Wash, Colorado, site. This report summarize meteorological data, groundwater quality data for alluvial wells, deep wells, retort 1 through 6, and surface water quality for streams. Much of this data is also included in the annual summary presented in Nelson, 1980. Analyses of various process waters are also included.

ABSTRACT

Accession Number:
@ 569
McDermott, W.F., Dec. 1979, Occidental vertical modified in-situ process for the recovery of oil from oil shale, Phase II, quarterly progress report for the period Sept. 1, 1979 through Nov. 30, 1979: U.S. DOE Rep./ DOE/LC/10036-T2, 122 p.

Contact: NTIS (copy)
LETC Library (loan)

Key Categories: COLORADO, CLIMATE, GROUNDWATER QUALITY

Access Code: 002 Use Code: 03

This is a quarterly progress report that covers the period September 1 through November 30, 1979 under the scope of work for Phase II of the DOE/Occidental Oil Shale Cooperative Agreement. Appendices to this report present meteorological data from the Logan Wash, Colorado, site and preliminary results of a water quality monitoring program.

ABSTRACT

Accession Number:
@ 569.1
McKee, J.M., and Kunchal, S.K., Oct. 1976, Energy and water requirements for an oil shale plant based on Paraho processes: Quarterly of the Colorado School of Mines, Proceedings of the 9th Oil Shale Symposium, v. 71, no. 4,p. 49-64.

Contact: CSM (copy)

Key Categories: SURFACE, PROCESS WATER USE

Access Code: 011 Use Code: 02

The purpose of this paper is to identify the net energy and water balance of the direct-mode and indirect-mode Paraho process, based on actual, demonstrated retorting test conditions at Anvil Points. Energy consumption within the system or thermal efficiency of the plant are closely related to water consumption and the economics. For example, in the electric power generation section of a plant, a heat rate of 10,000 Btu/kilowatt-hour (or a thermal efficiency of about 34 percent) could be achieved with all water cooling while about 15,000 Btu/kilowatt-hour (or thermal efficiency of about 23 percent) results with air cooling and investment requirements increases as well. An attempt is made here to optimize energy and water requirements on an overall basis. The article presents water requirements for various uses (i.e., cooling water, mining and crushing) for direct and indirect-mode Paraho processes.

ABSTRACT

Accession Number:
@ 570
McKee, Chet, Economics of dewatering for in situ retorting of oil shale.

Contact: Linda Tripp (loan)

Key Categories: GROUNDWATER QUANTITY, COLORADO

Access Code: 011 Use Code: 02

This report overviews hydrologic properties of the Piceance basin and discusses methods to prevent flooding of in-situ retorts. Various methods of local dewatering are described and formulas are presented to calculate drawdown. The economics of dewatering are discussed, and formulas are developed to determine the cost of a particular dewatering system.

BLM Library
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P.O. Box 25047
Denver, CO 80225

ABSTRACT

Accession Number:
@ 570.1
McKee, C.R., and Serafini, A., Oct. 1978, Bibliography of subsidence and related topics for in situ coal gasification: DOE Rep. LETC/BL-71316-1, 137 p.

Contact: U.S. Government Prinitng Office (copy)

Key Categories: SURFACE, IN SITU, SUBSIDENCE, BIBLIOGRAPHY

Access Code: 011 Use Code: 01

This is a general bibliography on subsidence. Most of the references relate to subsidence of coal mines or to subsidence in general. Since there is very little relevant information on subsidence of oil shale mines, this reference is included to provide the reader with a broad background on subsidence in related industries.

The topics included in the present bibliography are: (1) subsidence; (2) subsidence models; (3) material properties and in situ measurements; and (4) hydrology of fractured media. Each topic is indexed by year and then alphabetically by author within each year. Abstracts of each article are included when available.

ABSTRACT

Accession Number:
@ 570.2
McKell, C.M., 1978, Establishment of native plants for the
rehabilitation of Paraho processed oil shale in an arid
environment: in Wright, R.A., ed., The reclamation of disturbed
arid lands, Univ. of New Mexico Press.

Contact: Cyrus McKell (copy)

Key Categories: SURFACE, RECLAMATION

Access Code: 011 Use Code: 01

A baseline data-gathering program conducted on the oil shale tracts during 1975 and 1976 and predevelopment studies from 1975 to the present have identified many problems that would be encountered should land rehabilitation be necessary. Thus, many techniques have been worked out in rehabilitation research that can be applied as oil shale development increases. The purpose of this discussion is to describe: (1) some of the problems associated with rehabilitation of spent shale from the Paraho retort process under the arid conditions of the Uinta Basin of northeastern Utah, and (2) suitable techniques for establishing native shrubs on disposal piles and disturbed sites.

BLM Library
Denver Federal Center
Bldg. 85, OC-521
P.O. Box 25047
Denver, CO 80225

ABSTRACT

Accession Number:
@ 571
McWhorter, D.B., 1981, Field leaching study of raw mined oil shale: report of activities, 4/1/80 - 8/15/81, Colorado State University, Fort Collins, Colorado.

Contact: Ed Bates (copy)

Key Categories: LEACHING, IN-SITU

Access Code: 011 Use Code: 01

This is a progress report on a field study to determine the volume and chemical composition of raw shale leachates. Lysimeters were located on lease tract C-a and C-b and filled with raw shale from shaft and underground excavations. Leachates produced by precipitation were collected and analyzed for various major, minor and trace elements including pH, EC, TDS, F, Cl, SO_4, Zn, Fe, Co, Li, V, B, Mn, Na, and Sr. This report summarizes the results of the first year of these studies.

ABSTRACT

Accession Number:
@ 572
McWhorter, D.B., 1981, Reconnaissance study of leachate quality from raw mined oil shale--laboratory columns: final report on Grant No. R806278 submitted to the EPA by Colorado State University, Fort Collins, Colorado, 53 p.

Contact: Ed Bates (copy)

Key Categories: LEACHING, SURFACE, IN-SITU

Access Code: 011 Use Code: 01

Columns of mined raw oil shale, soils, and previously exposed oil shales were leached with de-ionized water in the laboratory as a means of characterizing the quality of leachates that will be generated from surface storage of mined shale. Leaching was conducted under saturated conditions and unsaturated conditions. In one set of tests, the initial saturated leaching was followed by a second saturated leaching after a period of drainage and aeration. The tests on the soils and previously exposed shales were conducted to provide a basis fpr comparison of the results from the raw mined shales. The results indicate that leachates from mined shales will contain dissolved solids at levels substantially greater than the background levels as indicated by the soils and previously exposed shales. This study indicates that the trace elements Al, B, F, Zn, Pb, and possibly Mo occur in leachates from some of the mined shales in quantities significantly greater than in the leachates from the background materials. All other trace elements considered in this study were present in the effluents from the mined shales in about the same concentration as observed in the leachates from the soils and previously exposed shales.

Although the maximum observed concentrations of Cr, F, Fe, Hg, Mn, NO_3, Pb, SO_4, TDS, and Zn were found to exceed the respective drinking water criteria, in no case did the concentration of measured constituents exceed the standard by 100 fold.

ABSTRACT

Accession Number:
@ 573
McWhorter, D.B., 1981, Laboratory leaching of bi-modal porous-media: in Proceedings of the 14th Oil Shale Symposium, Colorado School of Mines Press, Golden, Colorado, 376-387

Contact: Colorado School of Mines (copy)

Key Categories: LEACHING, SURFACE, IN-SITU

Access Code: 011 Use Code: 01

This paper summarizes the results of some laboratory column leaching studies using raw shales from tract C-a, the Colony mine, and elsewhere. Observed ranges of major, minor, and trace elements are summarized, and log-log plots of electrical conductivity as a function of pore volums are presented. The author presents preliminary evidence that bi-modal porosity is important in modeling oil shale leaching, and he formulates a mathamatical model describing the observed phenomenon.

ABSTRACT

Accession Number:
@ 575
Meglen, R.R., and Erickson, G.A., 1981, Application of pattern recognition to the evaluation of contamination from oil shale retorting: in Proceedings life science symposium series, environmental and solid waste, characterization, treatment, and disposal, October 4-8, 1981, Gatlinburg, Tenn. [in press 1982]

Contact: Bob Meglen (copy)

Key Categories: COLORADO, LEACHING, IN-SITU, ENVIRONMENTAL

Access Code: 011 Use Code: 02

This paper describes the application of pattern recognition techniques to the design and interpretation of site monitoring data. The methods were applied to monitoring data from Occidental's Logan Wash, Colorado, experimental modified in-situ retorting site. The monitoring plan for this site requires the measurement of 74 different water quality parameters before, during, and after retort is fired in waters from local streams, alluvial wells, bedrock wells, satellite wells, and the retort itself.

This paper describes the application of a multidimensional pattern recognition technique to the analysis and interpretation of the resulting data. This study reveals that the majority of the information obtained from all 74 parameters can be derived from only 12 of them, Li, B, Mn, Sr, Al, SO_4, conductivity, pH, total alkalinity, Kjeldahl nitrogen, and phenols.

A more extensive report is presently being prepared which describes the methods and results of this study, including the impact of the experimental retorts at Logan Wash on local water quality.

ABSTRACT

Accession Number:
@ 575.1
Melgen, R., and Erickson, G.A., Dec. 1981, Pattern recognition data analysis of water quality data for retort #6, Logan Wash, Colorado: final report prepared by Infometrix, Inc., Seattle, WA for University of Colorado, 64 p.

Contact: Bob Meglen (copy)

Key Categories: COLORADO, GROUNDWATER QUALITY, SURFACE WATER QUALITY, ENVIRONMENTAL

Access Code: 011 Use Code: 01

The purpose of this study was to apply pattern recognition techniques, capable of handling many variables simultaneously, to the large number of measurements of water constituents and physical characteristics from the Logan Wash, Colorado, experimental oil shale site area. Use of these data analysis techniques was prompted by the expectation that, because of the number of intermittent nature of the measurements, standard statistical techniques would fail to extract the significant relationships hidden in the data set.

The data included measurements for up to 77 features on 700 water samples taken from 31 sampling sites in and around Retort 6 at Logan Wash on the edge of the Piceance Basin region in Colorado, over a five year period from mid-1975 to early 1981.

This report describes the water chemistries of the different sample sites, noting major differences between the five types of sampling sites (alluvial, stream, retort, deep bedrock and satellite wells). It ascertains whether any contamination (changes) occurred in the wells surrounding the retort. It determined the minimum number of variables, of the original 77 measured, that are important to monitor in order to distinguish between the various sites, either in terms of water chemistries or contamination. It examines the necessity to improve the analytical precision of the measurements. And it determines the optimum monitoring frequency for the minimum number of variables necessary to identify possible changes in water quality due to retorting.

ABSTRACT

Accession Number:
@ 576
Mehran, M., Narasimhan, T.N., and Fox, J.P., 1981, Hydrogeologic consequences of the modified in-situ retorting process, Piceance Creek basin, Colorado: in Proceedings of the 14th Oil Shale Symposium, Colorado School of Mines Press, Golden, Colorado, p. 388-400.

Contact: Colorado School of Mines (copy)
Gloria Gill - LBL (copy)

Key Categories: COMPUTER MODELS, GROUNDWATER QUANTITY, COLORADO

Access Code: 011 Use Code: 02

In the modified in-situ retorting process (MIS), the region of retorting will act as a large subsurface sink and lead to a massive dewatering of the surrounding hydrogeologic system. The present study has been aimed at studying the possible alteration of the groundwater regime in and around the C-a and the C-b tracts due to the proposed MIS strategies. Our approach has been one of scenario analysis and parametric studies, using a numerical model.

The results suggest that mine-inflow rates will gradually increase with time and that the phreatic surface will be drawn down significantly over several square kilometers around the C-a and C-b tracts. These drawdowns could have profound effects on the shallow groundwater and surface water supplies. The expected inflow rates may vary from 0.15 to 1.4 m^3/sec at the C-a tract and from 0.5 to 0.9 m^3/sec at the C-b tract. The computations suggest that over a 30-year period of activity at the C-a tract, the water table in the vicinity of a tributary to the Yellow Creek may be drawn down by as much as 31 m. Similarly, 60 years of MIS retorting at the C-b tract may draw down the water table in the vicinity of the Piceance Creek by 100 m or more.

ABSTRACT

Accession Number:
@ 577
Mehran, M., Narasimhan, T.N., and Fox, J.P., 1980 An investigation of
dewatering for the modified in-situ retorting process, Piceance
Creek Basin, Colorado: Lawrence Berkeley Laboratory Rep. LBL-11819
(also published as v. 5 of Western oil shale development: a
technology assessment, Battelle Pacific Northwest Laboratory Report
PNL-3820, v. 5, Jan. 1982).

Contact: Gloria Gill - LBL (copy)

Key Categories: COMPUTER MODELS, GROUNDWATER QUANTITY, COLORADO

Access Code: 011 Use Code: 01

This study investigates the nature and impacts of dewatering and reinvasion that are likely to accompany the modified in-situ process. Previous studies along these lines have been carried out by the U.S. Geological Survey and others (i.e., Tipton and Kalmbach, Inc. and Golder Associates).

The present study extends these earlier investigations through more refined mathematical analysis. Physical phenomena not adequately covered in previous studies, particularly the desaturation process, are investigated. The present study uses a parametric approach to identify the key variables that are required to characterize systems such as those at the C-a and C-b tracts.

ABSTRACT

Accession Number:
@ 577.1
Meiman, J.R., 1974, Infiltration studies in the Piceance basin,
Colorado: Thorne Ecological Institute, Boulder, Colorado, 124 p.

Contact: Colorado State Library (loan)

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 03

Thirty-nine complete one-hour infiltration runs with the U.S. Geological Survey (USGS) rainfall-simulated infiltrometer were made on selected sites in the Piceance Basin Regional Oil Shale Study Area in Colorado during the summer of 1973. Rainfall rates of from 8 to 12 cm (3.1 to 4.7 inches) per hour were used to simulate short-duration, intense, summer storms.

Available data indicate that the soil-covered ridges and bottomlands of the Study Area have high infiltration rates ranging from 5 to 10 cm per hour for durations of 1 hour. These high infiltration rates prevent excessive runoff; they are particularly important on bottomlands that must infiltrate large amounts of runoff from adjacent rocky slopes and outcrops.

Removal of the protective cover of vegetation and litter may reduce infiltration to about 2 cm per hour. The highly calcareous soils found here appear much more susceptible to this reduction than do the less calcareous soils. Furthermore, the mineral soil underlying juniper litter tended to resist wetting.

Infiltration runs on bare spent shale indicate that infiltration rates of 3 to 4 cm per hour might be expected on materials similar to those on the old Anvil Points disposal pile. Infiltration on the very fine TOSCO (The Oil Shale Corporation) processed shale approached zero where it was left in a powdery, dry, untreated condition. TOSCO shale that either had been kept moist on the surface or mulched had infiltration rates of 2.0 to 2.5 cm for a one-hour period; rates as high as 3.4 cm per hour were found where living vegetation was present.

Plot studies that would cover much larger areas of the Study Area and also sample the seasonal variation in soil moisture and structural conditions would be most helpful in refining and expanding the results of these relatively crude field studies.

ABSTRACT

Accession Number:
@ 578
Meiman, J.R., April 1974, Environmental impact assessment of oil shale development on surface runoff, Piceance Creek basin, Rio Blanco and Garfield counties, Colorado: ROSS-21, Boulder, Colorado, Thorne Ecological Institute, 31 p.

Contact: Colorado State Library (loan)

Key Categories: SURFACE WATER QUALITY, COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This report evaluates the potential impact of an oil shale industry in northwestern Colrado on surface runoff from the area. the assessments are qualitative and focus on surface and underground mining at tract C-a and underground mining at tract C-b. The author concludes that, unless the soil is compacted, large increases in surface runoff from disturbed areas in the vicinity of tracts C-a and C-b would not be expected.

ABSTRACT

Accession Number:
@ 578.1
Meiman, J.R., Dec. 1972, Hydrologic inventory analysis and impact study of the Colony Property, Garfield County, Colorado: report prepared by Thorne Ecological Institute for Colony Development Operation; in appendix v. 7-9, Chapter V, the Colony Environmental Study, Parachute Creek, Garfield County, Colorado, Colony Development Operation, An environmental impact analysis for a shale oil complex at Parachute Creek, Colorado.

Contact: BLM - Vernal, Craig (loan)

Key Categories: COLORADO, CLIMATE, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

This report collates and interprets existing data and presents some new data on hydrologic aspects of the Dow property important in assessing ecological relationships. Surface water characteristics were determined from analyses of regional data on precipitation and runoff and from field observations. Available data included runoff records, snow measurements, and limited climatic data. Measurements made on site included channel cross sections, ground cover estimates correlated with soil descriptions, and snow cover from aerial photographs. The report inventories available data and information on precipitation, runoff, evapotranspiration, and groundwater, and it estimates the impact of oil shale development on surface runoff. Appendices present runoff calculations, ground cover conditions, and an annotated photo file.

ABSTRACT

Accession Number:
@ 578.2
Meiman, J.R., and Cringan, A.T., Aug. 1972, Snow survey, 1972: report prepared by Thorne Ecological Institute for Colony Development Operation, in appendix v. 7-9, Chapter XI, The Colony Environmental Study, Parachute Creek, Garfield County, Colorado, Colony Development Operation, An environmental impact analysis for a shale oil complex at Parachute Creek, Colorado.

Contact: BLM - Vernal, Craig (loan)

Key Categories: COLORADO, CLIMATE

Access Code: 002 Use Code: 02

This report presents the results of a snow survey made on the Dow property during 1972. Two snow courses were selected on the upland mesa part of the property to sample the effect of aspect. Depths and water equivalents were obtained from a Federal snow sample. Oblique photographs of snow cover were obtained during three flights over the area, and transects were located on the valley floor and adjacent slopes. This report summarizes the results of these measurements.

ABSTRACT

Accession Number:
@ 578.3
Melancon, S.M., Hess, B.C., and Thomas, R.W., Sept. 1980, Assessment of energy resource development impact on water quality: the Yampa and White River basin: Rep. EPA-600/7-80-151, 168 p.

Contact: NTIS (copy)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, SURFACE WATER QUALITY, GROUNDWATER QUALITY, ENVIRONMENTAL

Access Code: 002 Use Code: 02

The primary objective of this report is to evaluate the existing water quality monitoring network in the Yampa and White River Basins and to recommend needed modifications to the present sampling program. As a basis for these recommendations, present and planned developments are discussed and available data examined. The impact of developers on water quality and quantity is defined, particularly related to coal strip mining activities in the vicinity of Craig and oil shale activities in the Piceance Creek Basin.

A monitoring network designed to detect trends in surface water quality is proposed on the basis of our present knowledge. Such a network minimizes the number of observations at the expense of the number of stations in order to provide statistically valid data.

A similar network for ground-water monitoring needs to be implemented, particularly in the Piceance Basin; however, presently available data are insufficient to adequately determine specific station locations.

Those biological, physical, and chemical parameters likely to be affected by energy resource development activities were determined. Salinity and suspended sediment concentrations are already a problem in both study basins, and nutrient levels are sufficiently high in the downstream White River that any reservoir construction associated with energy development would likely result in excessive algal growth conditions.

ABSTRACT

Accession Number:
@ 579
Mercer, B., 1981, Co-disposal of retort water with spent shale: in Petersen, K.K., ed., Oil shale, the environmental challenges II, Colorado School of Mines Press, Golden, Colorado, [in press 1982].

Contact: Kathy Petersen (status)

Key Categories: EFFLUENTS, SURFACE

Access Code: 011 Use Code: 02

Many developers have proposed to dispose of process effluents by using it to cool hot spent shale prior to disposal, to moisturize spent shale to facilitate compaction, or to control dust. Since some of these wastewaters, particularly gas condensates and retort waters, contain high concentrations of organic and inorganic contaminants, concern has been expressed over the mobility and fate of these codisposed waters. Pretreatment of the effluents prior to codisposal may be required.

This paper reviews several treatment processes which may be useful to remove organic matter from retort water prior to codisposal with the spent shale. The chemcial composition of retort water is overviewed. General descriptions and research reviews are provided on the following processes: stream stripping, biological treatment activated carbon absorption, evaporation, incineration, wet air oxidation and liquid-liquid extraction.

ABSTRACT

Accession Number:
@ 579.1
Mercer, B.W., Wakamiya, W., and Mason, M.J., Nov. 1981, Evaporation of in-situ oil shale retort water: in King, C.J., Lynn, S., and Mohr, D.H., Jr., eds., Processing needs and methodology for contaminated water streams from synfuels processes, Draft.

Contact: Fred Whitmer (status)

Key Categories: IN-SITU, EFFLUENTS

Access Code: 011 Use Code: 02

The purpose of this study was to determine the operating conditions and process variations associated with evaporation of oil shale retort water. The work was divided into two phases. Phase I was conducted to determine 1) the effectiveness of feed pretreatment relative to distillate quality; 2) the optimal degree of concentration; and 3) any potential operational problems such as fouling or foaming. Phase II was the actual evaporation test using a 95 l/day bench-scale evaporator. The operating conditions for the evaporator were estimated in the Phase I tests. Operating data and analyses of samples taken during the operation of the evaporator were used to develop the process flows and energy costs for a proposed full-scale system.

ABSTRACT

Accession Number:
@ 580
Mercer, B.W., May 1980, Environmental control technology for shale oil wastewaters: in processing needs and methodology for wasterwaters from the conversion of coal, oil shale and biomass to synfuels, U.S. DOE Rep. DOE/EV-0081, p. N-1.

Contact: Charles Grum (copy)

Key Categories: EFFLUENTS, SURFACE, IN-SITU

Access Code: 011 Use Code: 02

This paper summarizes the results of research at Battelle Pacific Northwest Laboratory on the treatment and disposal of surface and in situ retort waters. Characterization data are presented for a simulated in situ, a Geokinetics, and a Paraho retort water. Results of bench-scale treatability studies on biological treatment and activated carbon sorption are presented. A potential treatment flow diagram is presented and estimates of effluent quality and treatment costs are given. Potential reuse opportunities for retort water are explored.

ABSTRACT

Accession Number:
@ 580.1
Mercer, B.W., Mason, M.J., Spencer, R.R., Wong, A.L., and Wakamiya, W., 1980, Evaluation of physical-chemical and biological treatment of shale oil retort water: Battelle Pacific Northwest Laboratory report to U.S. DOE, 105 p.

Contact: Charles Grua (loan)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 01

This report focuses on the treatment of in situ retort waters using conventional biological, physical, and chemical processes. It reviews the literature on the characterization of retort waters and discusses treatment criteria, i.e., discharge and reuse water quality standards. A generic treatment flowsheet is proposed which consists of the removal of suspended oils and solids, ammonia removal, biological treatment, and carbon sorption. Various unit processes used for each of these steps (i.e., suspended solids removal by gravity separation, air flotation, filtration) are qualitatively discussed. The results of bench-scale treatability studies to evaluate some of these unit processes are presented. The treatment processes evaluated include anaerobic digestion and activiated sludge for removal of biodegradable organics and other oxidizable substances; activated carbon absorption for removal of nonbiodegradable organics; steam stripping for ammonia removal; and chemical coagulation, sedimentation and filtration for removal of suspended matter. Preliminary treatment costs in dollars per thousand gallons of water treated are presented for physical-chemical and biological treatment.

ABSTRACT

Accession Number:
@ 581
Mercer, B.W., Campbell, A.C., and Wakamiya, W., May 1979, Evaluation of land disposal and underground injection of shale oil wastewaters: Battelle-Pacific Northwest Laboratory Rep. PNL-2596, 31 p., plus Appendix A.

Contact: Basil Mercer (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 01

Results indicate that the salinity of retort water, the principal wastewater generated by shale oil recovery operations, will be too high in most cases for irrigation of cover crops needed for effective stabilization by land disposal. Furthermore, large storage lagoons would be required to hold the retort water during the long winters encountered in the oil shale regions of Colorado, Wyoming and Utah. Land disposal cannot be carried out during prolonged periods of freezing weather. Additional problems which may arise with land disposal include air pollution from volatile constituents and groundwater pollution from refractory organics and dissolved salts in the retort water. Pretreatment requirements include the removal of ammonia which is present at toxic concentrations in retort water. Underground injection of retort water may be permitted in regions possessing favorable geological characteristics. It is anticipated that this method would be used as a last resort where effective or reasonable priced treatment technology is not available. Regulatory restraints are expected to limit the use of underground injection for disposal of highly polluted shale oil wastewaters. Proving the confinement of injected wastes, a frequently difficult and expensive task, will be required to assure protection of drinking water resources.

ABSTRACT

Accession Number:
@ 581.1
Mercer, B.W., Campbell, A.C., and Wakamiya, W., 1978, Land disposal and underground injection of shale oil wastewaters: American Chemical Society, Division of Environmental Chemistry, Preprints, v. 18, no. 1, p. 110-113.

Contact: Basil Mercer (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 002 Use Code: 02

A discussion showed that the salinity of retort water from shale oil recovery operations will be too high in most cases for irrigation cover crops needed for effective stabilization by land treatment and disposal. Large storage lagoons would be required to hold the retort water during the long winters encountered in the oil shale regions of Colorado, Wyoming, and Utah. Additional problems which may arise with land disposal include air pollution from volatile constituents and groundwater pollution from refractory organics and groundwater pollution from refractory organics and dissolved salt in retort water. Regulatory restraints are expected to limit the use of underground injection for disposal of highly polluted shale oil water. Proof of confinement of injected wastes will be required to assure protection of drinking water resources, and this is often difficult to accomplish.

ABSTRACT

Accession Number:
@ 582
Mercer, B.W., Wakamiya, W., Spencer, R.R., and Mason, M.J., Sept. 1979, Assessment of control technology for shale oil wastewaters: in Proceedings of U.S. Dept. of Energy Environmental Control Technology Symposium, Washington, D.C., Nov. 28-30, 1978, v. 1 of 3, Plenary session and fossil fuels, p. 308, U.S. DOE Rep. DOE/EV-0046.

Contact: Basil Mercer (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 01

This paper addresses studies undertaken at Pacific Northwest Laboratory to assess current technology for the treatment and disposal of shale oil wastewaters to maintain acceptable water quality levels. The paper presents characterization data on several in situ retort waters. Land disposal, underground injection, and conventional treatment are evaluated. The results of experimental studies on steam stripping and biological treatment of retort waters and on fluoride and boron removal from minewaters are presented.

ABSTRACT

Accession Number:
@ 583
Meredith, J.A., and Petticrew, D.E., 1980, Water analysis for baseline characterization and process development of a multimineral oil shale process: in Jackson, L.P., and Wright, C.C., eds., Analysis of waters associated with alternative fuel production, ASTM STP 720, p. 28.

Contact: ASTM (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY, SPRINGS, WATER LAW

Access Code: 011 Use Code: 02

The Superior Oil Co. has been involved in process development of a multimineral process to be used on oil shale and associated minerals in the northern part of the Piceance Creek Basin in northwestern Colorado. The past sampling and analysis program on surface and groundwater has mainly been directed toward answering process concerns (quantity and quality), since our process water is to be derived from the lower aquifer. In reviewing the laws and regulations for the purpose of developing a program designed specifically to obtain the necessary permits for construction, a lack of firm requirements for baseline water quality has been identified.

The article describes the location of Superior Oil Co.'s baseline water quality monitoring sites and summarizes water quality analyses (Na, Ca, Mg, Cl, HCO_3 SO_4, TDS, SIO_2, F, alkalinity) for two springs and several stations along Piceance Creek and the White River.

ABSTRACT

Accession Number:
@ 584
Merino, J., 1982, Reclamation of processed shale and industry: in Petersen, K.K., ed., Oil shale, the environmental challenges II, Colorado School of Mines Press, Golden, Colorado, [in press 1982].

Contact: Bill Chappell (copy)

Key Categories: RECLAMATION, SURFACE

Access Code: 011 Use Code: 01

This article reviews TOSCO's reclamation program, from the 1960's through the present. The article focuses on revegetation of spent shale piles.

ABSTRACT

Accession Number:
@ 584.1
Merino, J.M., and Crookston, R.B., 1977, Reclamation of spent oil shale: Mining Congress Journal, v. 63, no. 10, p. 31-36.

Contact: Joe Merino (copy)

Key Categories: SURFACE, RECLAMATION

Access Code: 002 Use Code: 03

At first glance, the reclamation of processed oil shales, or spent shale as it is often called, may appear a straight-forward procedure, especially since the material basically is the same as the native soils of the oil shale region. To some critics of the oil shale industry, however, revegetation appears to be an impossible task. Tosco has spent over a decade studying the properties and problems of the spent shale that results from the use of Tosco II process, and developing the knowledge and techniques to reclaim it. This material will be disposed of by forming it into a stable embankment on the surface, preferably in a shallow canyon or valley, and revegetating the surface with a self-sustaining plant community. Also under serious study are techniques to return the material underground in a form that will allow safe and permanent disposal in completed sections of the oil shale mine itself, although realistic and cost-effective means of accomplishing this remain to be developed. Surface disposal and revegetation, at this time the most efficient method for dealing with processed shale, are discussed in detail.

ABSTRACT

Accession Number:
@ 584.2
Mernick and Company, June 1978, Floodplain information report - White River, Sulphur Creek, Sanderson Heights Drainageway, Meeker, Colorado: Denver, Colorado, 18 p. plus figures.

Contact:

Key Categories: COLORADO, FLOODS

Access Code: 002 Use Code: 02

This floodplain information report presents the results of a study on the White River and Sulphur Creek floodplains in the vicinity of Meeker, Colorado. The report includes sections on the study area, historic flooding, hydrologic and hydraulic determinations, and interpretations and use of report data.

ABSTRACT

Accession Number:
@ 584.3
Messer, J.J., Israelsen, E.K., and Adams, V.D., 1981, Natural salinity removal processes in reservoirs: Utah Water Research Laboratory Rep. UWRL/Q-81/03, 84 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: WYOMING, SALINITY

Access Code: 011 Use Code: 02

A small but significant amount of salinity removal has been reported by various authors to occur in mainstem Colorado River reservoirs. Recalculation of some of these salinity budgets, together with a review of the data bases used, suggests that removal has not often been conclusively demonstrated. Laboratory microcosm experiments and field data indicate that calcium carbonate precipitation, perhaps with some coprecipitation of magnesium carbonate, is the mechanism responsible for most of the salinity removal in Oneida Reservoir, Idaho. Coprecipitation processes (including ion exchange), coagulation, and bioassimilation do not appear to be important natural salinity removal mechanisms. Finally, loss of calcium, relative to monovalent cations, may decrease water quality for irrigation purposes through increasing the sodium adsorption ratio (SAR), despite a gross decrease in the TDS. The potential role of various reservoir operation options in managing natural salinity removal processes and the value of such removal is discussed.

ABSTRACT

Accession Number:
@ 585
Metcalf and Eddy, Inc., Oct. 1975, Water pollution potential from surface disposal of processed oil shale from the TOSCO II process, v. I, A report to Colony Development Operation, Atlantic Richfield Co., operator.

Contact: Phyllis Fox (loan)

Key Categories: LEACHING, SURFACE, EFFLUENTS

Access Code: 011 Use Code: 01

This report summarizes the results of laboratory and field studies to evaluate the pollution potential of surface disposal of TOSCO II spent shale. The majority of the work was conducted in field lysimeters consisting of an 8 foot wide by 42 foot long test bed with a maximum depth of 4.5 feet. This facility was used to investigate the extent and composition of runoff during successive precipitation events; the extent to which surface and groundwaters can penetrate the pile and the conditions under which this occurs; the fate of water which penetrates the pile; the composition of percolate; and the effect of cold-weather events on surface compaction. Laboratory batch leaching tests were conducted to determine the extent to which organics present in the moisturization water would be mobilized during leaching.

ABSTRACT

Accession Number:
@ 585.1
Metcalf and Eddy Engineering, Inc., 1975, Investigation of hydrogeology and surface water hydrology of Davis and Middle Fork Creeks: a report to Colony Development Operation.

Contact: proprietary

Key Categories: COLORADO, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SURFACE WATER QUALITY, SURFACE WATER QUANTITY.

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 586
Miernyk, W., Oct. 1969, An interindustry forecasting model with water quantity and quality constraints: in Systems analysis for Great Lakes water research, p. 49-58.

Contact: Denver Public Library (loan)

Key Categories: UTAH, COLORADO, WYOMING, COMPUTER MODELS

Access Code: 002 Use Code: 02

A method used to make long-range projections of economic activity in the Colorado River Basin with water quantity and quality constraints was described. Six sets of projections were made, one for each sub-basin of the Colorado River Basin, with 1980 and 2010 as the target years. The forecasting model was the conventional open Leontief input-output model with changing input coefficients. Separate transaction tables were constructed for each of the six sub-basins, with 1960 as the base year. Non-agricultural and agricultural data were collected and linked together by balancing import rows and export columns. The result being a 'pure' interregional interindustry model. Two sets of projections were completed, one for water quality only and the other involving both quantity and quality constraints. Three general illustrative cases for agricultural sectors, commercial and industrial users, and municipal users, were sketched. In order to measure damages due to water quality degradation, total gross output as given by the quantity constrained projections, minus total gross output in the quality-constrained projections was used.

ABSTRACT

Accession Number:
@ 586.1
Milhous, R.T., 1981, The PHABSIM System for instream flow studies: in
Proceedings summer computer simulation conference, Toronto, Canada.

Contact: Instream Flow and Aquatic System Group (copy)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 01

This paper describes the stream-reach model recommended and used by the Instream Flow Group of the U.S. Fish and Wildlife Service for physical habitat simulations. This model uses multiple transects, each of which is subdivided into n subsections. For any unobserved discharge or stage (water-surface elevation), the mean depth and velocity of each subsection is calculated. The surface area represented by these values of depth and velocity is calculated for the entire reach.

ABSTRACT

Accession Number:
@ 586.2

Miller, A.K., and Costin, L.S., 1981, Structural analysis of modified in situ oil shale retorts: in Proceedings of the 14th Oil Shale Symposium, Colorado School of Mines Press, Golden, Colorado, p. 19-30.

Contact: Colorado School of Mines (copy)

Key Categories: SUBSIDENCE, IN-SITU

Access Code: 011 Use Code: 02

Structural analysis, using modern numerical techniques, can assist in identifying potential design problems and can provide guidance in the selection and placement of instrumentation used to measure the structural response of modified in situ retorts. This paper presents the results of such an analysis of a typical retort configuration. In this analysis, the effects of kerogen content, material anisotropy, local stratigraphy and rubble loading on the resultant stresses and displacements are considered and the results are compared to a baseline calculation where the oil shale is considered to be isotropic, homogeneous and of nominal kerogen content. In addition, an orthotropic material failure model which predicts the failure of oil shale under complex combined states of stress is presented and incorporated into the analysis. Regions where the combined stress state causes the material to most nearly approach the failure condition are identified. Such results assist in locating regions where future stability analysis should be concentrated and suggest possible sites for the location of stress and displacement measurement instrumentation.

ABSTRACT

Accession Number:
@ 587
Miller, C.A., June 1971, Abridged bibliography, economics of water quality - salinity pollution: Environmental Resources Center Information Series no. 2, OWRR B-042-COL(1), 154 p.

Contact: Environmental Resources Center (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, BIBLIOGRAPHY

Access Code: 002 Use Code: 02

This bibliography of approximately 360 citations was extracted from a microfiche library of 400 documents and was developed as part of an economic water quality study. The references related to the economic impacts of salinity pollution and the salinity problems of the Colorado basin and especially the Grand Valley area of the upper basin. Also included are many references to physical and biological aspects of salinity pollution. The bibliography contains 4 sections -- author, title, source and master lists -- which were generated and printed out by a computer library routine, reduced and reproduced as originally printed.

ABSTRACT

Accession Number:
@ 587.1
Miller, J.B., Dec. 1977, The interaction of water with saline evaporite minerals and its relationship to the salinity of the Green River in Wyoming: Southwestern Wyoming Water Quality Planning Association report, 23 p.

Contact: Jerry Miller (copy)

Key ategories: WYOMING, SALINITY

Access Code: 011 Use Code: 03

This report evaluates the potential of the "contact zone" to contribute to salinity of the Green River. The "contact zone" refers to the outcrop area where the gypsiferous Bridger Formation and the saline facies of the Green River Formation are in direct contact or outcrop adjacent to each other. In this zone, partially confined and very saline aquifers interact with surface waters. The author argues that any activities in this zone, such as drilling, which facilitate surface water groundwater interactions will generate significant salt loads. The author recommends that drilling and blasting be restricted in these areas.

ABSTRACT

Accession Number:
@ 587.2
Miller, J.B., Wegner, D.L., and Bruemmer, D.R., Salinity and phosphorus routing through the Colorado River/reservoir system: in Proceedings of the Symposium on the aquatic resources management of the Colorado River ecosystem, Nov. 16-18, 1981, Office of Water Research and Technology and Utah Water Research Laboratory, [in press 1982].

Contact: Jerry Miller (copy)

Key Categories: UTAH, WYOMING, SALINITY, SURFACE WATER QUALITY

Access Code: 011 Use Code: 02

This paper overviews the physical and biological interactions which occur in the Colorado River Basin. The paper focuses on salinity and phosphorus relationships in the reservoir sequences of Fontenelle, Flaming Gorge, Lake Powell, and Lake Mead. Sediment transport, temperature, biological productivity, and light penetration are also discussed.

The paper reviews the climate, geology and hydrology of the Colorado River basin. The variation of salinity over time for several points in the system is graphed and discussed and the effect of reservoirs on salinity is evaluated. Eutrophication and its relationship to phosphorus supply are discussed, and the phosphorus cycle in the Colorado River basin is reviewed.

ABSTRACT

Accession Number:
@ 587.3
Miller, G.A., 1982, Water availability and requirements for Western oil-shale development: in Environmental and Ecological Considerations in Energy Utilization, Reynolds, J., and others, eds., Ann Arbor Science, Ann Arbor, Mich.

Contact: Joseph Reynolds (status)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, PROCESS WATER USE

Access Code: 011 Use Code: 03

This article broadly overviews water requirements, water supply, and potential constraints on water use by an oil shale industry in the Piceance Basin. Industry water use is estimated to range from 1 to more than 6 barrels of water per barrel of shale oil with most estimates in the range of 1 to 4 barrels per barrel. Additional water will be required to support the increased population that will accompany development. Local runoff and groundwater appear adequate for water requirements of a large industry if certain legal, institutional, economic, and environmental issues can be resolved.

ABSTRACT

Accession Number:
@ 588
Milligan, J.H., Marsell, R.E., and Bagley, J.M., 1966, Mineralized springs in Utah and their effect on manageable water supplies: Utah Water Research Laboratory Rep. WG23-6, 50 p.

Contact: Utah State University Library (loan)

Key Categories: SALINITY, SPRINGS, UTAH

Access Code: 011 Use Code: 02

This report inventories mineralized springs in Utah with respect to location, hydrologic and geologic setting, and quantity and quality of water. It also appraises current and potential effects of these springs on usable water supplies and evaluates possible management and control measures to extend the usefulness of principal water supplies. Chemical analyses of some of the springs presented. A brief description of the physical and geologic setting of each spring or group of springs along with interpretation and evaluation of this information is present for each hydrologic region of the State. The discussion of the Uinta Unit includes two spring groups: Split Mountain Warm Springs and Strawberry Springs.

ABSTRACT

Accession Number:
@ 589
Milliken, J.C., and others, Sept. 1977, State and local management actions to reduce Colorado River salinity: Denver Research Institute, Denver, CO., Rep. EPA-908/3-77-002, 315 p.

Contact: DRI (loan)
USBR - Salt Lake City (loan)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, WATER LAW

Access Code: 002 Use Code: 03

This report identifies and analyzes state and local management actions to reduce salinity of the Colorado River. The benefit, qualitative estimate of cost, and overall feasibility of over 30 possible management actions are evaluated.

ABSTRACT

Accession Number:
@ 591
Milliken, J.G., Lohman, L.C., Trumbly, A.S., and Roll, L., 1979, Overcoming legal and institutional barriers to planned reuse of water in the Colorado River basin: Office of Water Research and Technology Rep. OWRT/RU-79/3, U.S. Dept. of the Interior, 201 p.

Contact: Gordon Milliken (loan)

Key Categories: COLORADO, WYOMING, UTAH, PRESENT WATER USE, WATER LAW

Access Code: 011 Use Code: 01

This study analyzes strategies to overcome the legal, institutional, and political obstacles to planned water reuse in the Colorado River Basin. Emphasis is given to nonagricultural reuse, and to consumptive reuse of low quality water.

Legal research identified barriers to reuse found in interstate and state-specific water allocation law, and in federal and state environmental laws. Institutional and political obstacles were identified through document review and comprehensive interviews with water management officials in the Basin. Societal positions toward different types of water reuse were documented through the available literature, while water reuser concerns were drawn from both interviews and documentation. Case studies of five actual or proposed reuse projects were conducted to establish the interaction between reuse barriers and incentives in real situations and to determine which solutions and strategies were most useful in promoting reuse.

The complex interaction of legal and institutional arrangements within the water management system of the Colorado River Basin results in some barriers and some incentives to planned reuse. Strategies promoting reuse include imaginative tactics by prospective reusers, strategic actions by state water allocators, changes to certain statutes, and reduction of institutional conflicts by making reuse benefits visible to parties in conflict over water resource development plans.

ABSTRACT

Accession Number:
@ 592
Mills, D.W., 1974, Water allocation for future development in the Uintah Basin: Master's Thesis, Utah State University, Logan, Utah.

Contact: Special Projects Office (loan)

Key Categories: UTAH, AVAILABLE WATER BY BASIN, PROCESS WATER USE

Access Code: 070 Use Code: 03

ABSTRACT

Accession Number:
@ 592.1
Minges, D.R, 1981, Peak discharge and frequency of floods in small watersheds: in Water-resources investigations of the U.S. Geological Survey in Colorado - fiscal year 1981, U.S. Geological Survey Open-File Report 81-150, p. 19.

Contact: Don Minges (status)

Key Categories: COLORADO, FLOODS, COMPUTER MODELS

Access Code: 011 Use Code: 01

The purpose of this study is to collect data and develop techniques for estimating the magnitude and frequency of floods in small watersheds, especially those crossed by State highways where data will be economically significant in the design of bridges and culverts. A computer model will be developed to predict rainfall-runoff relations that can be modified for each watershed according to its hydrologic and physical characteristics.

Data are collected from 47 rainfall-runoff recorder installations located throughout the State and supplemented with data collected from long-term streamflow-gaging stations in small watersheds, from the National Weather Service's rain-gage network in Colorado and adjacent States, and from related studies in progress.

To date, rainfall-runoff data are being collected at 12 sites in western Colorado. Computer models have been developed for selected watersheds and calibrated where sufficient data are available. Data analysis and model calibrations are being continued for sites in the South Platte River basin.

ABSTRACT

Accession Number:
@ 593

Monsanto Research Corp., 1982, Assessment of oil shale retort wastewater treatment and control technology: Dayton, Ohio.

Contact: Wally Liberick (status)

Key Categories: EFFLUENTS, SURFACE, IN-SITU

Access Code: 011 Use Code: 02

This is a five-phased study funded by the U.S. EPA at Monsanto Research Corp., Dayton, Ohio. The purpose of this study is to: (1) summarize known information concerning oil shale retort wastewater sources and characteristics; (2) identify potentially applicable control technologies; and (3) design, construct, and operate pilot-plant facilities to evaluate selected technologies. The results of the first two phases of this study were previously published in Klieve and Rawlings, 1981 (Abstract No. 510.1). Several other interim progress reports have been submitted to EPA. These describe the results of laboratory treatability studies. The reports published as of March 1982 are:

1. Steam Stripping of Occidental Petroleum Retort No. 6 Gas (Process) Condensate
2. Steam Stripping of Occidental Petroleum Retort Water
3. Steam Stripping of Venturi Scrubber Water Collected at LETC
4. Assessment of Hyperfiltration and Ultrafiltration for Treatment of Oil Shale Wastewater - Laboratory Feasibility Studies
5. Carbon Absorption Testing of Steam Stripped Occidental Petroleum Retort No. 6 Gas (Process) Condensate
6. Carbon Absorption Testing of Steam Stripped Occidental Petroleum Retort Water
7. Respirometry Testing of Steam Stripped Occidental Petroleum Retort No. 6 Gas (Process) Condensate
8. Respiratory Testing of Steam Stripped Occidental Petroleum Retort Water.

A mobile pilot-plant, incorporating some of these unit processes, has been constructed and will be tested during the burn of Occidental Retorts 7 & 8 at Logan Wash, Colorado. Current information on this project, and copies of the interim progress reports, may be obtained by contacting the EPA project officer, Wally Liberick.

ABSTRACT

Accession Number:
@ 593.1
Moore, R., and Mills, T., Dec. 1977, An environmental guide to western surface mining. Part two: impacts, mitigation and monitoring: Fish and Wildlife Service Report FWS/OBS-78/04.

Contact: Western Energy and Land Use Team (copy)

Key Categories: ENVIRONMENTAL, COLORADO, WYOMING, UTAH, RECLAMATION

Access Code: 011 Use Code: 02

The guide assembles information about the effects of surface mining in the Northern Great Plains Region on fish and wildlife resources, and recommends ways to mitigate these effects through carefully planned lease and permit stipulations. Divided into five sections, Chapter I describes the content and use of the manual. Chapter II discusses the regional ecology, distribution of minerals and the surfacemining techniques likely to be utilized within the region. Chapter III contains a list of 36 impact activities associated with surface mining and traces the way in which these activities affect fish and wildlife resources. Chapter IV contains discussions of how the barious mine-related effects may be mitigated at high, medium and low levels of effort. Chapter V contains a conceptual approach to development of a site- specific monitoring program and provides recommendations of individual ecosystem components.

ABSTRACT

Accession Number:
@ 594
Morris, G.E., May 1978, Energy development and the Upper Colorado River basin optimization model: Los Alamos Scientific Laboratory, Los Alamos, New Mexico.

Contact: DRI (loan)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS

Access Code: 042 Use Code: 02

The resource constraints used to complete the model focus on the natural and legal restrictions associated with surface water availability and the occurence of five energy resources: underground coal, strip coal, oil and natural gas, oil shale, and uranium. These resource constraints are associated with resource areas called hydrobasins which are, in turn, linked to the interregional input-output portion of the model by simple consistency relationships.

The model was run under two objective functions (maximum regional income and minimum regional income) and various combinations of activity coefficients and constraint values.

ABSTRACT

Accession Number:
@ 595
Moses, R.J., July 1966, Where is the water coming from?: Quarterly of the Colorado School of Mines, Golden, Colorado, Colorado School of Mines Press, v. 61, no. 3, p. 413-422.

Contact: Colorado School of Mines (copy)

Key Categories: AVAILABLE WATER BY BASIN, PRESENT WATER USE, COLORADO

Access Code: 011 Use Code: 03

This paper presents the view that water availability for oil shale development is not the real issue, but rather the "timing" of oil shale development, and thus, of the need for the water. He points out that Colorado law does not permit the reservation of water for future use and points out that priority of time of appropriation to a beneficial use secures the prior right. The paper summarizes present (1966), committed (1966), and potential depletions of the Colorado River chargeable to Colorado.

ABSTRACT

Accession Number:
@ 596
Moussavi, M., and Yen, T.F., 1976, Environmental improvements by oil shale leasing: in Yen, T.F., ed., Science and technology of oil shale, Ann Arbor, MI, Ann Arbor Publishers, Inc.

Contact: T.F. Yen (copy)

Key Categories: ENVIRONMENTAL, COLORADO, WYOMING, UTAH

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 596.1
Moyer, J., 1982, TOSCO-Sand Wash environmental baseline data: TOSCO
Corporation, Denver, Colorado.

Contact: Jim Moyer (status)

Key Categories: UTAH, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 01

TOSCO Corp., Denver, Colorado has announced that it will develop its Sand Wash Utah, property located about 20 miles south of Vernal. A 43,000-47,000 BPD TOSCO surface retorting facility has been proposed. Construction is projected to start in 1982.

Hydrologic testing has been initiated at this site. To date (March 1982), four test holes have been completed. Pumping tests have been conducted on these and some water quality data have been collected. Additional baseline monitoring will be conducted in the future. No publically available reports have been published to date. Jim Moyer, TOSCO Corp., should be contacted for additional information on the baseline monitoring program.

ABSTRACT

Accession Number:
@ 596.2
Multimineral Corp., 1982, Groundwater monitoring program: letter to P. Fox from K. Weston dated 2/24/82.

Contact: Jim Weston (access)

Key Categories: COLORADO, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

The Multimineral Corporation is conducting a groundwater monitoring program as part of the development program at their site in the Piceance Basin. As of February 1982, 11 wells had been drilled and were being monitored. Various tests, including aquifer tests, spinner logs, geophysical logs, drill-stem tests, injectivity profiles, and drill cores were conducted at select wells. The results of these investigations is not publically available. The following summarize the location of the wells and the type of data taken:

	WELL NUMBER AND LOCATION										
DATA COLLECTED FROM DRILL HOLES	MMC-IRI-1 98W 1SS26	MMC-IRI-2 98W 1S 27	MMC-IRI-3 98W 1S 27	MMC-IRI-4 98W 1S 23	MMC-IRI-5 98W 1S 23	MMC-IRI-6 98W 1S 23	MMC-IRI-7 98W 1S 23	MMC-IRI-8 98W 1S 23	MMC-IRI-9 98W 1S 34	MMC-IRI-10 98W 1S 14	MMC-IRI-11 98W 1S 25
Water levels-Upper Aquifer		X		X	X	X	X	X			
Water levels-Lower Aquifer	X		X	X	X	X	X	X	X	X	X
Drawdowns, T and S from aquifer tests				X	X	X	X				
Drawdowns, water quality, discharge during aquifer tests								X			
Discharge, Eh, pH, E.C., Temp. during air-rotary drilling						X	X	X			
Spinner logs						X	X	X			
Geophysical logs	X	X	X	X	X	X	X	X	X	X	X
Drill-stem tests				X				X			
Injectivity profiles								X			
Drill core	X	X	X	X	X				X	X	X

ABSTRACT

Accession Number:
@ 597
Mundorff, J.C., 1977, Reconnaissance of water quality in the Duchesne River basin and some adjacent drainage areas, Utah: Utah Dept. of Natural Resources, Technical Publication No. 55, 47 p. plus 5 plates.

Contact: Utah Division of Water Rights (copy)
USGS -Salt Lake City (copy)

Key Categories: UTAH, SEDIMENT, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, CLIMATE

Access Code: 011 Use Code: 01

This report on the quality of surface water in the Duchesne River basin and some adjacent areas describes the general inorganic chemical characteristics of surface waters, discusses the effects of the natural environment and the present water use on these chemical characteristics, and describes the characteristics of sediment discharge from the basin. The geology, soils, and major water developments within the area are described. The chemical quality of water in the area is overviewed and the effect of saline soils and diversions on chemical quality are addressed. The origin of high boron and strastium concentrations, which occur in several tributaries of the Duchesne and Strawberry Rivers, are discussed. An appendix summarizes water data for over 150 stations including discharge, dissolved solids, and conductivity ranges; dominant cations and anions; existence of upstream storage, diversions, or irrigation; dominant geologic influence on water quality; and water use problems. Plates show the location of water quality sampling sites and approximate range of concentrations of TDS; normal annual and normal October-April precipitation; geology; areas of saline soils and poor drainage; and chemical characteristics of surface water at selected sites.

ABSTRACT

Accession Number:
@ 598
Mundorff, J.C., 1971, Nonthermal springs of Utah: Utah Geological and Mineral Survey Water-Resources Bulletin 16, 20 p. plus 2 plates.

Contact: Utah Geological and Mineral Survey (copy)

Key Categories: UTAH, SPRINGS

Access Code: 002 Use Code: 02

This report summarizes information on about 4,500 nonthermal springs that discharge in the State of Utah. Many of these springs are located on a pocket plate. The density of other springs is indicated by computer printout maps based on water-right applications. Locations (range/township) and common names for these 4,500 springs are tabulated in an appendix table. The results of chemical analyses of waters from many of the major springs are summarized in another table. The text discusses the geology, discharge, and chemical characteristics of groups of springs in areas where springs are clustered.

The only area of spring clustering in the Utah oil shale basin is in the Vernal area. This section of the report provides descriptions of ten of the major springs in the Vernal area. a 1:250,000 map of the Vernal area, showing the generalized geology of the area and spring locations, is provided.

ABSTRACT

Accession Number:
@ 598.1
Mundorff, J.D., 1970, Major thermal springs of Utah: Utah Geological and Mineralogical Survey Water-Resources Bulletin 13, 60 p. plus 2 plates.

Contact: Utah Geological and Mineralogical Survey (copy)

Key Categories: UTAH, SPRINGS

Access Code: 002 Use Code: 03

As part of a study of the springs of Utah, reconnaissance data were obtained on the thermal, chemical, and geologic characteristics of the major thermal springs of Utah. Only three of the springs have temperatures near the boiling point of water; the maximum recorded temperatures of these springs range from 185° to 189°F. All three springs are in or near areas of late Tertiary or Quaternary volcanism.

Of the 68 springs surveyed in this report, only one falls within or near the Utah oil shale basin. Split Mountain Warm Spring, (D-4-24) 16cdd-S1, issues from limestones of Missippian age along Mitten Canyon, about 15 miles east of Vernal in Uintah County. Data obtained by the U.S. Geological Survey in 1948 shows a temperature of 86°F, a dissolved solids contents of 942 ppm, and an estimated discharge of at least 12 cfs.

ABSTRACT

Accession Number:
@ 599
Mundorff, J.C., 1968, Fluvial sediment in Utah, 1905-65, a data compilation: Utah Department of Natural Resources, Division of Water Rights Information Bulletin 20, 400 p.

Contact: USGS -Salt Lake City (loan)

Key Categories: UTAH, SEDIMENT

Access Code: 002 Use Code: 01

During the past 60 years, the characteristics of fluvial sediment in many streams in the United States have been studied by Federal agencies. The purpose of this report is to present available data--both published and unpublished--on fluvial sediment in Utah for the period 1905-65.

ABSTRACT

Accession Number:
@ 600
Murphy, C.L., Hines, A.L., and Poulson, R.E., 1978, Hot gas stripping of simulated in situ oil shale retort water: American Chemical Society, Division of Fuel Chemistry, Preprints, v. 23, no. 2, p. 193-201.

Contact: Dick Poulson (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

This study evaluates the use of hot gas stripping to remove NH_3 and CO_2 from in-situ retort waters. Results of an experimental study are presented which show that NH_3 and CO_2 can be effectively removed from wastewater by hot gas stripping. At a stripping temperature of 200°F and a stripping ratio of 40 SCF/gal, the ammonia concentration was reduced from 11,000 ppm to 3.7 ppm and the bicarbonate concentration was reduced from 47,000 ppm to 220 ppm. These values reflect a removal of about 99.5%. The components introduced into the stripping gas could be removed by a number of methods including incineration and adsorption. Assuming an NH_3 concentration of 13,000 ppm in a process that produces 50,000 barrels of water per day, the potential ammonia recovery would be about 41,600 tons per year. Because of the value of ammonia to the fertilizer industry, its recovery should be economically feasible.

ABSTRACT

Accession Number:
@ 601
Murray, Keith D., ed., 1974, Guidebook to the energy resources of the Piceance Creek Basin, Colorado: papers presented at the 25th field conference, Rocky Mountain Association of Geologists, Denver, 302 p.

Contact: none

Key Categories: PROCEEDINGS, COLORADO

Access Code: 182 Use Code: 02

The emphasis of the 1974 Field Conference is on all phases of oil shale study - geology, mining, processing, water requirements, water disposal, power requirements, and environmental concerns. The guidebook contains a significant proportion of articles emphasizing environmental problems associated with the extractive phase of the industry.

ABSTRACT

Accession Number:
@ 601.1
Myers, D., Dorset, P., and Parker, T., 1977, Oil shale and the environment: Rep. EPA-600/9-77-033, 30 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 03

An evaluation of oil shale perspectives in the Colorado-Utah-Wyoming areas is presented. Environmental aspects are examined along with research efforts.

It is concluded that the outlook for oil shale, the costs of production, the sources for the required large capital investments, the competition from foreign oil and from new domestic supply are all uncertain. Moreover, the costs of protecting the environment are uncertain, there are uncertain front-end costs the industry may have to absorb to reduce social impacts in oil shale regions, and government's future role is also uncertain.

ABSTRACT

Accession Number:
@ 601.2
Nakamichi, H., Morel-Seytoux, H.J., Oct. 1969, Suitability of the Upper Colorado River basin for precipitation management: Colorado State University Hydrology Paper No. 36, 62 p.

Contact: Engineering Research Center (copy)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 03

Watershed suitability for weather modificaton over the entire Upper Colorado River basin is discussed from the hydrologic standpoint. Determination of watershed or groups of watersheds for precipitation management programs was a primary objective of the study, particularly in the San Juan mountains and the upper part of the Colorado River basin. A relationship between precipitation and spring runoff with greater than 0.90 correlation coefficient was obtained for 365 sets of gaged subbasins by applying a multiple linear regression analysis, the independent variables being winter and spring precipitation assuming a uniform 10% increase in winter precipitation on the Upper Colorado River basin, calculations show that three years of operations are needed for evaluation in that basin versus six years in the San Juan mountains.

ABSTRACT

Accession Number:
@ 602
Narayanan, R., Padungchai, S., and Bishop, A.B., 1979, An economic evaluation of the salinity impacts from energy development: the case of the Upper Colorado River basin: Utah Water Research Laboratory Rep. UWRL/P-79/07, 71 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: SALINITY, UTAH, COMPUTER MODELS, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 02

A linear programming model was developed to analyze the effect of potential energy development on water allocation and water quality in the Upper Colorado River basin. This model was used to predict changes in salinity and to determine least-cost strategies to maintain established numeric salinity criteria. The effectiveness of various alternative control measures was evaluated within institutional constraints. Optimal salinity levels over time were proposed, based on cost-benefit analyses. The economic feasibility of presently planned structural measures to reduce salinity was investigated and contrasted with nonstructural alternatives.

ABSTRACT

Accession Number:
@ 603
National Academy of Sciences, 1980, Surface mining of non-coal minerals, appendix II, Mining and processing of oil shale and tar sands: Washington, D.C., 222 p.

Contact: National Academy of Sciences (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL, EFFLUENTS, LEACHING, SURFACE, IN-SITU

Access Code: 011 Use Code: 02

This is an appendix to the main report, Surface Mining of Non-Coal Minerals (Abstract No. 604) which focuses on oil shale and tar sands development in the western United States. This report evaluates the relation of oil shale and tar sands mining and processing to the environmental provisions of PL 95-87. It presents assumed scenarios for development of oil shale and describes the resource. The geography, climate, air quality, water supply, plants and animals, land use and ownership, and mineral ownership of the Western oil shale region are described. Oil shale technology is overviewed and environmental impacts on land, water, air and biological resources are described and means to control these impacts are discussed.

ABSTRACT

Accession Number:
@ 604
National Academy of Sciences, 1979, Surface mining of non-coal minerals, a study of mineral mining from the perspective of the Surface Mining and Reclamation Act of 1977: Washington, D.C., 339 p.

Contact: National Academy of Sciences (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL, WATER LAW, RECLAMATION

Access Code: 011 Use Code: 02

The surface Mining Control and Reclamation Act of 1977 (PL 95-87), in Section 709 on Study of Reclamation Standards for Surface Mining of Other Minerals, called for an in-depth study of current and developing technologies for surface and open pit mining and reclamation for minerals other than coal. The purpose of this study was to evaluate the application of the standards set forth in PL 95-87 to these other industries, and specifically, to assess the degree to which these requirements could be met and the costs involved and to recommend alternate regulatory mechanisms.

This report presents the results of that study. It addresses surface mining and reclamation in the following industries: oil shale and tar sands, construction minerals, natural building stone, and clays and bauxite. It also addresses large open-pit mines in areas of low water tables and in humid environments and surface mining of coastal plain deposits and discontinuous ore bodies in sedimentary formations. The report contains major chapters on mining and reclamation problems, water management and reclamation practices, existing governmental controls and reclamation requirements, applicability of PL 95-87 to non-coal minerals, and alternative institutional approaches for surface mining control and reclamation.

ABSTRACT

Accession Number:
@ 605
National Academy of Sciences, National Research Council, Committee on Water, 1968, Water and choice in the Colorado Basin - an example of alternatives in water management: Washington, D.C.

Contact: DRI (loan)
National Academy of Sciences (copy)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN

Access Code: 042 Use Code: 03

In the present report, the Committee on Water of the National Research Council gives its attention principally to water problems and management in the Colorado River basin as a means of providing a concrete example of the general suggestions presented in its earlier report, Alternatives in Water Management. Water management, of course is only one of the major fields in which substantial investment may prove beneficial to a regional economy. For purposes of illustration in this context, the Committee has chosen the State of Arizona. The Committee devotes Chapter 5 to several alternative fields for investment in regional economic development that could be at least equally beneficial. Thus, it suggests that choice with respect to water-mangement programs is in two dimensions: (1) between water programs and other programs, and (2) between alternative water-management programs.

ABSTRACT

Accession Number:
@ 605.1
National Oceanic and Atmospheric Administration, Serial, River forecasts provided by the National Weather Service: U.S. Dept. of Commerce, Washington, D.C.

Contact: National Climatic Service (copy)

Key Categories: COLORADO, WYOMING, UTAH, SURFACE WATER QUANTITY, FLOODS

Access Code: 002 Use Code: 02

This annual publication, first issued for 1972 data under this title and format, is a successor to DAILY RIVER STAGES (described below). It describes in detail the river forecast and warning services as well as other hydrologic services provided by the National Weather Service. Also included are tables of River Forecast Points and Miscellaneous Information, Highest Stages at National Weather Service Gages, and Record High Stages Prior to Gage Records, and a list of points for which water supply forecasts are issued.

Previous publications (67 volumes) were issued under various titles: Volume 1, STAGES OF THE OHIO RIVER AND OF ITS PRINCIPAL TRIBUTARIES, 1858 TO 1889; Volume 2, STAGES OF THE MISSISSIPPI RIVER AND OF ITS PRINCIPAL TRIBUTARIES, EXCEPT THE OHIO RIVER, 1860 TO 1889; Volume 3, STAGES OF WATER AT MISCELLANEOUS RIVER STATIONS IN CALIFORNIA, OREGON, NORTH CAROLINA, ETC., 1875 TO 1889; Volumes 4-44, DAILY RIVER STAGES AT RIVER GAGE STATIONS ON THE PRINCIPAL RIVERS OF THE UNITED STATES; and Volumes 45-67, DAILY RIVER STAGES. Volumes 4-44 cover the years 1890 through 1948; several of those volumes contain data for more than one year. DAILY RIVER STAGES covers the period 1949 through 1971 and contains river gage data and related information for about 600 stations located on the principal rivers of the United States.

Many volumes of these publications are out of print. DAILY RIVER STAGES have been filmed for the period 1968 through 1971. RIVER FORECASTS PROVIDED BY THE NATIONAL WEATHER SERVICE have been filmed for the period 1972 through 1977. The National Climatic Center, Federal Building, Asheville, NC 28801 can provide microfilm copy of all filmed publications and paper copy of the original records that contain daily river stage data for the years subsequent to 1971.

ABSTRACT

Accession Number:
@ 605.2
National Oceanic and Atmospheric Administration, Serial, Storage-gage precipitation data for western United States: U.S. Dept. of Commerce, Washington, D.C.

Contact: National Climatic Center (copy)

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 002 Use Code: 01

This annual publication, issued from 1955 through 1976, presented precipitation data and a station index for locations in the remote areas in the State of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming that are equipped with storage precipitation gages that require reading and maintenance only at monthly or seasonal intervals. It also contained a station location map for each State or portion of a State. This data bulletin was terminated as a separate publication with the data for the 1975-1976 season. Data for subsequent seasons are included in the annual issues of CLIMATOLOGICAL DATA for the appropriate State; however, data for many stations are no longer received. Volume 21 (1975-1976 season) of this publication contains a listing of stations from which data may be obtained.

Prior to 1940, some storage-gage station precipitation data were published in monthly issues of CLIMATOLOGICAL DATA for the appropriate State. From January 1940 through August 1948, available storage-gage precipitation data were published for river basin areas (rather than for States) in the HYDROLOGIC BULLETINS. Publication of these data again reverted to the CLIMATOLOGICAL DATA on a annual basis (for the season July through June) in the June 1949, 1950, and 1951 issues and July 1952, 1953, 1954, 1955, and 1956 issues.

ABSTRACT

Accession Number:
@ 605.3
National Oceanic and Atmospheric Administration, Serial, Hourly precipitation data, (Wyoming, Colorado, or Utah): U.S. Dept. of Commerce, Washington, D.C.

Contact: National Climatic Center (copy)

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 002 Use Code: 01

This publication is prepared monthly and annually for Colorado, Wyoming and Utah. A predecessor publication, which began in January 1940, was known as the HYDROLOGIC BULLETIN and was issued by river drainage districts. During June through September 1948, depending on the river drainage district, that publication was discontinued and hourly precipitation values were included in the monthly issues of CLIMATOLOGICAL DATA for each State or combination of States. This continued until October 1951, when these data were published under the present title. Beginning with the January 1973 issue, monthly maximum amounts of precipitation for selected intervals from 15 minutes to 24 hours are presented (only stations equipped with special gages that measure to tenths of an inch have data for time intervals other than whole hours.)

The current monthly issue presents daily, hourly, and monthly maximum short duration precipitation data for stations equipped with the automatic recording gages. The annual issue contains a station index, with monthly and annual totals of precipitation and annual maximum precipitation by time categories. The June and December issues normally present late reports and corrections.

ABSTRACT

Accession Number:
@ 606
National Oceanic and Atmospheric Administration, Serial,
Climatological data,(Colorado, Wyoming, or Utah): U.S. Dept. of Commerce, Washington, D.C.

Contact: National Climatic Center (copy)

Key Categories: WYOMING, COLORADO, UTAH, CLIMATE

Access Code: 002 Use Code: 01

This publication presents basic monthly and annual climatological data. It is published for each state or combination of states. This series was first published by the Weather Bureau in the late 1890's as the CLIMATE AND CROP SERVICE OF THE WEATHER BUREAU. In February 1906, the title was changed to CLIMATOLOGICAL SERVICE OF THE WEATHER BUREAU. Beginning in July 1909, and continuning through December 1913, the monthly data were included as a part of the MONTHLY WEATHER REVIEW, but were presented on a drainage district basis. The annual data, however, were not published under this title. Beginning with January 1914 CLIMATOLOGICAL DATA has been published monthly and annually.

The current monthly issue contains a temperature and precipitation extremes table, published since January 1958; a supplemental data table; a summarized station and divisional data table; a daily precipitation table; a daily temperature table; a daily snowfall and snow on the ground table; evaporation and wind table; daily soil temperature; and a station index table. Monthly and seasonal heating degree days and monthly and seasonal snowfall are published in the July issue only. The monthly and seasonal heating degree days were published in the June issue only from 1951 through 1961, and the monthly and seasonal snowfall in the June issue only from 1950 through 1961. When unusual and outstanding weather has occurred within the state during the month, a narrative summary of the events may be included. The June and December issues normally carry late reports and corrections.

The annual issues presents tables as follows: monthly and annual average temperature and departures from normal; monthly and annual total precipitation and departures from normal; temperature extremes and freeze data; monthly and annual total evaporation and wind movement; monthly and annual total evaporation temperature at selected depth; precipitation measured in storage gages; and a station index.

ABSTRACT

Accession Number:
@ 607
National Oceanic and Atmospheric Administration, 1974, Climates of the states, v. II--western states, including Alaska and Hawaii: U.S. Dept. of Commerce, Washington, D.C.

Contact: National Climatic Center (copy)

Key Categories: CLIMATE, WYOMING, COLORADO, UTAH

Access Code: 011 Use Code: 02

This publication summarizes pertinent climatic data for Colorado, Wyoming, Utah, and other western states. The physical features and climate of each state are described and pertinent climatic data from other National Oceanic and Atmospheric Administration reports are presented in tabular format. The reported information includes freeze data and monthly, annual, and extreme precipitation and temperature data. Maps are presented which show the location of climatic stations and present isolines for mean annual precipitation, mean minimum temperature in July and January, and mean maximum temperature in July and January.

ABSTRACT

Accession Number:
@ 607.1
National Oceanic and Atmospheric Administration, 1973,
Precipitation-frequency atlas of the western United States: v. II Wyoming, v. III Colorado, v. VI Utah, NOAA Atlas 2, U.S. Dept. of Commerce, Washington, D.C.

Contact: U.S. Government Printing Office (copy)

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 002 Use Code: 01

This atlas, published in looseleaf form in 1973, contains eleven volumes, one volume for each of the western states. All maps are prepared on the same 1:2,000,000 scale. It is based upon all of the previous work on precipitation-frequency studies and presents the precipitation-frequency regime in more detail and with greater accuracy. This atlas supersedes the information for the western states contained in Weather Bureau Technical Paper No. 40 that was published in 1961.

Each volume is organized in three parts as follows:

1. The first part discusses the historical background, procedures, and methods used in preparing the maps and how to interpret them.

2. The second part discusses ideas that are applicable only to the particular state considered in the volume. Included in this part are methods (nomograms and equations) useful for estimating precipitation-frequency values for durations other than 6 or 24 hours, e.g., 5-, 10-, 15-, and 30-minutes or 1-, 2-, 3-, and 12- hours.

3. The third part contains maps for the 6- and 24-hour durations for return periods of 2-, 5-, 10-, 25-, 50-, and 100-years.

ABSTRACT

Accession Number:
@ 607.2
National Oceanic and Atmospheric Administration, 1970, Monthly normals of temperature, precipitation, and heating and cooling degree days, 1941-70: Climatography of the United States no. 81, U.S. Dept. of Commerce, Washington, D.C.

Contact: National Climatic Center (copy)

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 002 Use Code: 01

This publication, issued for each State, or combination of States and for Puerto Rico, U.S. Virgin Islands and Swan Island combined (45 separate publications), contains monthly and annual normals of these four elements for all National Weather Service stations in the State and for all Cooperative Climatological Stations in the State which have adequate records for this 30-year period. Also included are separate listings showing the latitude, longitude, and elevation for each station that reports temperature, and for those stations that report precipitation, and a map showing the location of all stations for which normals are published. In Utah, data is presented for Duchesne, Ft. Duchesne, Myton, Vernal, and Jensen. In Wyoming, data is presented for Evanston, Lyman, Komerer, and Green River, and in Colorado, for Rifle, Gravel Function, and Glenwood Springs.

A similar publication was prepared for the 30-year period 1931 through 1960 but did not include cooling-degree days. In addition, an earlier publication of the same title was published as U.S. Weather Bureau Technical Paper No. 31 in 1956. It contained normals for the 1921-1950 period, but did not include the normals for Cooperative Climatological Stations.

ABSTRACT

Accession Number:
@ 607.3
National Oceanic and Atmospheric Administration, 1971, Climate of
(Colorado, Wyoming, or Utah): Climatography of the United States
no. 60, U.S. Dept. of Commerce, Washington, D.C.

Contact: National Climatic Center (copy)

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 002 Use Code: 02

This publication is issued for each of the 50 states and for Puerto Rico-U.S. Virgin Islands combined. Each publication contains a narrative climatic summary of the State, the means and extremes table for each cooperative climatological station in the State that is in the CLIMATOGRAPHY OF THE UNITED STATES NO. 20, CLIMATE OF (NAME OF CITY) series, and the normals, means, and extremes table from the latest issue of LOCAL CLIMATOLOGICAL DATA, ANNUAL SUMMARY WITH COMPARATIVE DATA for all stations in the State at the time of publication. It also contains a map showing the locations of all stations for which data tables are presented.

This series is an updated and revised version of a similar series entitled CLIMATE OF THE STATES published between 1959-1961 with some subsequent revisions and reprints through 1972. Similar data for earlier years were included in the 1941 U.S. Department of Agriculture Yearbook, CLIMATE AND MAN, in a section entitled CLIMATES OF THE UNITED STATES.

ABSTRACT

Accession Number:
@ 608
National Petroleum Council, 1973, U.S. energy outlook, water availability: a report by the Water Availability Task Group of the Other Energy Resources Subcommittee of the National Petroleum Council's Committee on U.S. Energy Outlook.

Contact: National Petroleum Council (loan)

Key Categories: AVAILABLE WATER BY BASIN, PROCESS WATER USE, PRESENT WATER USE, COLORADO, WYOMING, UTAH

Access Code: 011 Use Code: 02

This report discusses the availability of water for electricity and synthetic fuel production in the Missouri River and Colorado River basins. Five development scenarios are formulated, and water requirements by region and state through 1985 for electricity production, synthetic gas, synthetic liquid, and oil shale are projected. The projected availability of this water is analyzed, and a number of constraints, including the existing regulatory framework and water quality impacts, are discussed.

ABSTRACT

Accession Number:
@ 609
National Technical Information Service, 1976, Oil shale mining, processing, uses, and environmental impacts: citations from the NTIS data base, 1964-March 1976, U.S. Dept. of Commerce.

Contact: NTIS (copy)

Key Categories: BIBLIOGRAPHY

Access Code: 011 Use Code: 02

This bibliography contains references to 223 publications dealing with mining, production and associated environmental impacts of oil shale development. Included in each citation are the title of the report, authors, corporate author, date, availability, price, keyword descriptors and abstract.

ABSTRACT

Accession Number:
@ 610
National Water Commission, 1973, A summary--digest of state water laws, National Water Commission, Arlington, VA.

Contact: Library of Congress (loan)

Key Categories: WATER LAW, COLORADO, WYOMING, UTAH

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 612
Nelson, Haley, Patterson and Quirk, Inc., Coon, King and Knowlton, and Valley Engineering, 1975, Utah State Colorado River complex, water quality management plan: State of Utah, Department of Social Sciences, Division of Health, Environmental Health Services Branch, Salt Lake City, Utah.

Contact: BLM - Vernal (loan)
Terry Riding (loan)

Key Categories: UTAH, AVAILABLE WATER BY BASIN, PRESENT WATER USE, CLIMATE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY

Access Code: 112 Use Code: 02

This is the 303e Water Quality Management Plan for the Colorado River Basin complex. The study area comprises that portion of Utah tributary to the Colorado River and includes the Green River basin, Upper Colorado River basin and the lower Colorado-San Jose River basin. The Paria River and Kanab Creek drainages are included and the Virgin River drainage is excluded.

The purpose of this Plan is to establish and coordinate activities related to water quality management on a river-basin scale. It identifies the Basin's water quality problems and outlines the State of Utah's program of remedial actions. Emphasis is placed on the control of point sources of pollution.

The report describes the basin characteristics (environmental setting, stream and shoreline conditions, streamflow characteristics, water availability and use, basin storage and diversion); population, economics and land use; basin water quality (stream standards, basin monitoring program); pollution sources (point and non-point sources); and a water quality management strategy (point source control, monitoring, future planning, public participation).

ABSTRACT

Accession Number:
@ 612.1
Nelson, Haley, Patterson and Quirk, Inc., June 1975, Water quality management plan, Colorado River basin: v. 1, recommended plan, v. 2, alternatives; v. 3, base data, Colorado Dept. of Health, Water Quality Control Division.

Contact: Bob Owen (loan)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, PRESENT WATER USE, CLIMATE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, ENVIRONMENTAL

Access Code: 002 Use Code: 02

This is the 303e Water Quality Management Plan for the Colorado River Basin within Colorado. It includes the following subbasins: Fraser-Williams Fork; Eagle-Piney; Rifle-Plateau; Upper Gunnison; Curecanti; North Fork-Uncompahgre; Grand Valley-Lower Gunnison; and Dolores-San Miguel.

The purpose of this Plan is to establish and coordinate activities related to water quality management on a river-basin scale. It identifies the Basin's water quality problems and outlines the State of Colorado's program of remedial actions. Emphasis is placed on the control of point sources of pollution. The project report is organized in three volumes. Volume 1 describes the Recommended Water Quality Management Plan by subbasins, with a summary of supporting material. Forecast water uses, forecast wasteloads, criteria and methods used for evaluating wastewater treatment alternatives, and the selection and evaluation of feasible alternatives are presented in Volume 2. Volume 3 contains the base data, quality standards, and facilities inventory and evaluations used in preparation of the recommended plan.

ABSTRACT

Accession Number:
@ 612.2
Nelson, R.M., Jan. 1981, Occidental vertical modified in-situ process for the recovery of oil from oil shale, Phase II, quarterly progress report for the period Sept. 1, 1980 through Nov. 30, 1980: U.S. DOE Rep. DOE/LC/10036-T7, 420 p.

Contact: NTIS (copy)
LETC Library (loan)

Key Categories: COLORADO, GROUNDWATER QUALITY, CLIMATE, IN-SITU, EFFLUENTS

Access Code: 002 Use Code: 02

This is a quarterly progress report that covers the period Sept. 1 through Nov. 30, 1980 under the work scope for Phase II of the DOE/Occidental Oil Shale Cooperative Agreement. Appendix B to this report summarizes environmental data collected during this period. Tabular summaries are presented of hourly wind direction, temperature, and relative humidity for four stations. Groundwater quality data are tabulated for several alluvial and deep wells and for water from abandoned retorts. NPDES monitoring data are also presented.

ABSTRACT

Accession Number:
@ 612.3
Nelson, R.M., Aug. 1980, Occidental vertical modified in-situ process for the recovery of oil from oil shale, phase II, annual progress report from the period June 1, 1979 through May 31, 1980: U.S. DOE Rep. DOE/LC/10036-T5, 570 p.

Contact: NTIS (copy)
LETC Library (loan)

Key Categories: COLORADO, CLIMATE, SURFACE WATER QUALITY, GROUNDWATER QUALITY, EFFLUENTS, IN-SITU

Access Code: 002 Use Code: 01

This annual progress report covers the period June 1, 1979 through May 31, 1980 under the scope of work for Phase II of the DOE/Occidental Oil Shale Cooperative Agreement. Appendices summarize the results of the Logan Wash water quality monitoring program. The purpose of this program is to characterize the hydrologic systems of the Logan Wash, Colorado, region and to demonstrate that no significant contamination of natural waters was taking place due to Retort 6 operation. Wells were located within the retort area, adjacent to it, and at points outside of the mine area. Several surface water sites were also monitored. The detailed results of this program are presented in an appendix to this report, including a technical discussion, statistical summaries of the data, and time plots for key parameters. The raw data, statistical analyses and charge balances are also presented. Other appendices present water quality analyses of process effluents and tabulate hourly and monthly meteorological data (wind speed and direction, relative humidity, temperature).

ABSTRACT

Accession Number:
@ 613
Nelson, W., Horak, G., and Lewis, M., 1978, Instream flow strategies for Utah: Fish and Wildlife Service Rep. FWS/OBS-78/45, 87 p.

Contact: Western Energy and Land Use Team (copy)

Key Categories: WATER LAW, PRESENT WATER USE, UTAH, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 02

This is one of 13 reports that identifies and evaluates the most promising institutional methods for reserving instream flows to benefit fish and wildlife in each of 13 western states. The states included in the study are Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming. Each report has three main sections. First is a guide to help the reader select the most important strategy for any given situation, followed by a summary evaluation of how well the method has worked in the state. The third part is a detailed narrative description of the procedures for implementing the strategy and an example of how it has been employed in the state.

ABSTRACT

Accession Number:
@ 614
Nelson, W., Horak, G., and Solomon, J., 1978, Instream flow strategies for Wyoming: Fish and Wildlife Service Rep. FWS/OBS-78/47, 88 p.

Contact: Western Energy and Land Use Team (copy)

Key Categories: WYOMING, WATER LAW, PRESENT WATER USE, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 02

This is one of 13 reports that identifies and evaluates the most promising institutional methods for reserving instream flows to benefit fish and wildlife in each of 13 western states. The states included in the study are Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming. Each report has three main sections. First is a guide to help the reader select the most important strategy for any given situation, followed by a summary evaluation of how well the method has worked in the state. The third part is a detailed narrative description of the procedures for implementing the strategy and an example of how it has been employed in the state.

ABSTRACT

Accession Number:
@ 615
Neuhold, J.M., July 28-31, The pollution environment: in
Energy, Environment and Water Resources, Proceedings of
Universities Council on Water Resources Meeting.

Contact: Utah State University Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 03

Oil shale and coal exploitation could be major contributors to the dewatering of the Colorado River basin. Pressure to increase food supplies will accentuate the current salinity problems of agriculture. A land use/water use planning function is called for on a regional basis. Limits have to be set in terms of population increases and in terms of industrial and resource development within the region so that the resources of population but for the nation at large.

ABSTRACT

Accession Number:
@ 616
Nevens, T.D., Habenich, C.H., and Culbertson, W.J., Jr., May 1977, Disposal of spent shale ash in 'in situ' retorted caverns: Denver Research Institute, University of Denver, Denver, Colorado.

Contact: Tom Nevens (loan)

Key Categories: IN-SITU, RECLAMATION

Access Code: 011 Use Code: 03

One abandonment strategy under consideration for in situ retorts is to fill the voids with a grout made of spent shale. This would reduce the permeability of abandoned in situ retorts, impeding the flow of groundwater through them and also increase their strength and stiffness.

This report summarizes the results of a laboratory study to evaluate the backfilling of an abandoned in situ retort with a slurry of Lurgi spent shale. Unconfined compressive strengths of set Lurgi slurries ranged from 5 to 100 psi, and permeability decreased from initial values of 10^{-4} cm/sec to 10^{-5} - 10^{-6} cm/sec after 28 days. A slurry with 164 percent by weight of water was poured into a hand-packed drum of in situ spent shale and water was drained from the bottom. No cementation was observed in this test, and the compressive strength after 13 days of curing was only 16 psi.

ABSTRACT

Accession Number:
@ 617

Nieves, L.A., and Marti, M.H., July 1980, Economic feasibility analysis of water harvesting techniques for mined-land reclamation: NTIS, Battelle Memorial Institute.

Contact: Bill Chappell (loan)

Key Categories: RECLAMATION, SURFACE,

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 617.1
Nowacki, P., 1980, Health hazards and pollution control in synthetic liquid fuel conversion: Noyes Data Corp., Park Ridge, New Jersey, 508 p.

Contact: Noyes Data Corp (copy)

Key Categories: SURFACE, IN-SITU, EFFLUENTS, COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 02

This book reviews the literature on oil shale structure and composition, oil shale processing, pollutants generated in oil shale processing, health effects associated with oil shale processing, environmental control in oil shale processing, and presents an environmental assessment of the Tosco II, Paraho, Union Oil, and in situ processes.

ABSTRACT

Accession Number:
@ 617.2
Nunamaker, J.F., Pingry, D.E., and Riley, R., April 1977, Hydrology and water resources in Arizona and the Southwest, vol. 7: Proceedings, meeting of the American Water Resources Association, Arizona Section, and Arizona Academy of Sciences, Hydrology Section, Las Vegas, Nevada, p. 1-6.

Contact:

Key Categories: COLORADO, WYOMING, UTAH, BIBLIOGRAPHY, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

A water supply data base was developed for the Colorado River basin states as a guide to existing natural, technical, economic and legal water data agencies in Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming. This data was developed in order to determine whether water of acceptable quality and quantity could be delivered to specific locations at reasonable costs. Water data structure, data base design and data base implementation were discussed, with an emphasis on the Colorado River basin area. The thrust of the article deals with basic water supply data base construction rather than specific information.

ABSTRACT

Accession Number:
@ 618
Occidental Oil Shale, Inc., 1981, Occidental monitoring data for the Logan Wash, Colorado site: Computer printout summarizing site monitoring data.

Contact: Bob Thomason (copy)

Key Categories: COLORADO, GROUNDWATER QUALITY, LEACHING, EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

Occidental Oil Shale Co. has computerized their environmental monitoring data for their Logan Wash, Colorado, experimental site. Hardcopy printouts or magnetic tapes of the raw monitoring data can be obtained by contacting Bob Thomason.

ABSTRACT

Accession Number:
@ 620
Odell, J.W., and Coffin, D.L., 1964, Water resources of Colorado: in mineral and water resources of Colorado, Washington, D.C., Committee on Interior and Insular Affairs, Committee Print, 88th Congress, 2nd Session, p. 233.

Contact: USGS Library (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 03

This report describes in summary form the mineral and water resources of Colorado. Its purpose is to give factual information about the present supplies of minerals and water in the State and a realistic appraisal of the supplies available for future production and consumption. Insofar as possible, the report is presented in nontechnical language. It is intended mainly for use by Government officials at the Federal, State and county levels; by leaders in industry and commerce; and by the schools and the lay public.

The section on water resources discusses the quality, quantity, and distribution of surface- and ground-water supplies that are being utilized and those that might be available for development, by geographic parts of the State. Additional information is presented in maps, graphs, and tables.

ABSTRACT

Accession Number:
@ 621
Office of Technology Assessment, U.S. Congress, June 1980, An assessment of oil shale technologies: OTA Rep. OTA-M-118, 517 p.

Contact: U.S. Government Printing Office (copy)

Key Categories: EFFLUENTS, ENVIRONMENTAL, PROCESS WATER USE, WATER LAW, COLORADO, WYOMING, UTAH, SURFACE, IN-SITU

Access Code: 011 Use Code: 01

For many decades, the oil shale resources of the Western United States have been considered possible contributors to the Nation's liquid fuel supply. This volume reviews several paths to development of these resources and the likely consequences of following these paths. A chapter providing background information about the nature of oil shale is followed by an evaluation of technologies for recovery of shale oil. The economics and finances of establishing an industry of various sizes are analyzed. The fact that much of the best shale is located on Federal land is examined in light of the desire to increase use of the resources. The consequences of shale development in terms of impact on the physical and social environments, and a discussion of the availability of water complete the report.

Policy options addressing barriers that could hinder the establishment of the industry are presented. These options, designed primarily for Congressional consideration, are limited to the obstacles OTA identified as currently existing. Other issues, of equal importance for the protection of the environment and the communities, but not constraints to development, are discussed in the body of the report. The assessment deals only with oil shale; no systematic attempt was made in this study to compare this energy source with liquid fuel sources other than conventional petroleum or with alternative energy strategies. Other OTA assessments are addressing many of these topics.

ABSTRACT

Accession Number:
@ 622
Office of Technology Assessment, U.S. Congress, July 1980, An
assessment of oil shale technologies, v. II, A history and analysis of the prototype oil shale leasing program: OTA Rep. OTA-M-119, 81 p.

Contact: U.S. Government Printing Office (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 01

This volume discusses the Federal Prototype Oil Shale Leasing Program that began in 1974 when the U.S. Department of the Interior sold leases to four tracts in the oil shale regions of Colorado and Utah. A prior leasing attempt in 1968 is also described because it provides an historical perspective about the imperatives that have encouraged the development of Federal oil shale lands by private industry and the restraints that have inhibited such development.

The report includes discussions of political, economic, environmental, and energy-related factors that affected both the 1968 leasing attempt and its successor—the current Prototype Program. The Program's goals are identified, and its progress and status are examined to determine if those goals have been met or are likely to be met in the foreseeable future.

ABSTRACT

Accession Number:
@ 622.1
Olgeirson, E.R., June 1979, Ecoclimate studies: U.S. DOE Rep.
LETC-10787-57, 48 p.

Contact: NTIS (copy)
Neil Young (loan)

Key Categories: UTAH, CLIMATE, RECLAMATION, IN-SITU

Access Code: 002 Use Code: 02

This report summarizes the results of ecoclimatic studies at the Geokinetics experimental site in Uintah County, Utah from April through November, 1978. The purpose of these studies is to define site-specific environmental characteristics that affect herbaceous plant productivity, to obtain information necessary to plan and evaluate revegetation of disturbed area, and to obtain data necessary to distinguish between and natural and development-caused disturbances. This report qualitatively discusses the results of these studies and present tabular summaries and seasonal plots of air and soil temperatures at several stations.

ABSTRACT

Accession Number:
@ 623
Ossio, E., and Fox, J.P., 1980, Anaerobic biological treatment of in situ retort water: Lawrence Berkeley Laboratory Rep. LBL-10481, 51 p.

Contact: Gloria Gill - LBL (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

Anaerobic fermentation was successfully used in a laboratory-scale batch digester to remove soluble organics from retort water. Required pretreatment includes reduction of ammonia levels to 360 mg-N/1, pH adjustment to 7.9, sulfide control, and the addition of the nutrients, calcium, magnesium, and phoshorus. If the prescribed pretreatment is used, BOD_5 and COD removal efficiencies of 89 to 90% and 65 to 70% are achieved, respectively.

The report also presents characterization data for several in-situ retort waters.

ABSTRACT

Accession Number:
@ 624
Ossio, E., Fox, J.P., Thomas, J.F, and Poulson, R.E., 1978, Anaerobic fermentation of simulated in situ oil shale retort water: Div. of Fuel Chemistry Preprints, v. 23, no. 2, p. 202, (Also published as Lawrence Berkeley Laboratory Rep. LBL-6855, 1977).

Contact: Gloria Gill - LBL (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

The feasiblity of removing soluble organics from oil shale retort water by anaerobic digestion with methane production was experimentally investigated. The following conclusions were made. The retort water studied had to be pretreated to remove NH_3 and to adjust the pH to 7, to reduce ammonia, and to add nutrients. A major fraction of the organics in the retort water studies was stabilized by conversion to CH_4 and CO_2, BOD_5 and COD removal efficiences were 76 to 80 percent. The effluent from anaerobic fermentation of the retort water studied (BOD_5: 530 to 580 mg/l) may be suitable for treatment by conventional aerobic processes.

ABSTRACT

Accession Number:
@ 625
Paraho, 1981, Paraho technical report, Uintah Basin synfuels, environmental impact statement information, Sept. 29, 1981.

Contact: Special Projects Office (loan)

Key Categories: PROCESS WATER USE, EFFLUENTS, LEACHING, RECLAMATION, SURFACE,

Access Code: 070 Use Code: 01

ABSTRACT

Accession Number:
@ 625.1
Park, W.C., Lindemanis, A.E., and Raab, G.A., 1979, Mineral changes during oil shale retorting: in In-Situ, v. 3, no. 4, p. 353 (republished with minor deletions and additions in Proceedings of the AIME-TMS Annual Meeting, Feb. 27, 1980).

Contact: Won Park (copy)

Key Categories: LEACHING, IN-SITU

Access Code: 011 Use Code: 02

Changes in the mineral content of dolomitic oil shale during in situ retorting were determined at temperatures and exposure times which bracket conditions anticipated during in situ retorting. The resulting samples were analyzed by x-ray diffraction to identify and quantitate the major mineral phases. Laboratory results were compared with cores from a spent in situ retort at Occidental's Logan Wash experimental site in Colorado. This information was used to propose a conceptual framework for mineral changes that occur during retorting. The resulting samples were leached and the effect of retorting conditions on leachate composition explored. These results indicate that the leachability of in situ spent shale may be minimized by the formation of silicate minerals at the high temperatures anticipated for in situ retorts.

ABSTRACT

Accession Number:
@ 626
Parker, H.W., and others, 1976, Simulated ground-water leaching of in situ retorted or burned oil shale: in preprints of papers presented at the 172nd National Meeting of the American Chemical Society, Division of Fuel Chemistry, in San Francisco, Aug. 29 - Sept. 3, 1976.

Contact: Harry Parker (copy)

Key Categories: LEACHING, IN-SITU

Access Code: 011 Use Code: 03

This paper presents the results of preliminary experiments on the leaching of several major and trace elements from laboratory-generated in-situ spent shale. Raw shale was retorted in a small reactor under variable conditions (temperature, retorting time, gaseous environment). The resulting solids were leached with distilled water and the leachates analyzed for Na, Ca, Mg, Cr, and other elements. The final results from this program are presented by Bethea et al., 1981 (Abstract No. 139).

ABSTRACT

Accession Number:
@ 626.1
Parry, W.T., Ballantyne, J.M., Bryant, N.L., and Dedolph, R.E., 1980, Geochemistry of hydrothermal alteration at the Roosevelt Hot Springs thermal area, Utah: Geochimica Et Cosmochimica Acta, v. 44, n. 1, p. 95-102

Contact: Denver Public Library (loan)

Key Categories: UTAH, SPRINGS

Access Code: 002 Use Code: 02

The Roosevelt thermal area, under evaluation as a commercial power source, contains a dilute brine at a surface temperature of 25°C (down from 85°C in 1950) with ionic strength of 0.1-0.2 and total dissovled solids of 6063-7792 MG per liter. The springs water contains 10 times the CA, 100 times the MG, and 2.5 times the sulfate of the deeper water. A model for development of the observed alternations is supported by observations and irreversible mass transfer calculations. Hydrothermal fluid rises along major fractures; cooling occurs by conduction and stream separation. PH rises from loss of carbon dioxide. Oxidation of h^2S takes place at the surface to form hydrogen and sulfate ions. This acid water percolates downward and reacts with feldspar in the rocks to produce alunite, kaolinite, montmorillonite, and muscovite within 30 meters of the surface, surface deposits consist of opaline sinter and sinter-cemented alluvium, altered by the sulfate-rich water to alunite and opal.

ABSTRACT

Accession Number:
@ 626.2
Parry, W.T., Benson, N.L., and Miller, C.D., July 1976, Geochemistry and hydrothermal alteration of selected Utah hot springs: v. 3, Rep. NSF/RA-760370, 137 p.

Contact: NTIS (copy)

Key Categories: UTAH, SPRINGS

Access Code: 002 Use Code: 02

This report detailed the results of estimation of subsurface temperatures in Utah from published water analyses and new analyses of selected hot springs. Two hot springs areas in differing geological environments were selected for detailed rock alteration studies.

The Monroe-Red Hill area is within an area of tertiary volcanics and is underlain by a thick Jurassic salt-bearing deposit. The Roosevelt area is in Tertiary and Precambrian crystalline rocks. Comparison of rock alteration and water chemistry in these two areas services as a model for further exploration and resource characterization in Utah using geochemical techniques. Hydrothermal alteration, heavy metal distribution and water chemistry provide some characterization of the Roosevelt System. The hot springs deposits consists of laminated opal and siliceous sinter. Geology and alteration have been mapped in the Monroe area.

ABSTRACT

Accession Number:
@ 626.3
Paskett, C., 1974, Sediment yield of selected watersheds west of the Great Plains: Master of Science thesis, 72 p.

Contact: University of Arizona Library (loan)

Key Categories: UTAH, WYOMING, SEDIMENT

Access Code: 002 Use Code: 02

Summarized are the roles of climate and runoff in eroding and transporting sediment in a selected group of large watershed basins in New Mexico, California, Oregon, Utah, Wyoming, and Washington. Annual sediment yields representing a total of 178 data years of 17 watersheds were correlated with climate in four separate regression models. An analysis of the regression equations describes the relative influence of desert, steppe, and forest climates in eroding sediment. The probabilistic models developed provide a forecast of yields and their relative frequency of occurrence. Desert climate produce maximal sediment yields, but those from forest climates were relatively high, thought to be a reaction caused by efficient sediment transport systems associated with mountainous terrain. Results are compared with those of other sediment yield models.

ABSTRACT

Accession Number:
@ 627

Patt, R.O., Adams, D.B., and Collins, D.L., 1982, Hydrologic data from the Naval Oil Shale Reserve No. 1, Parachute Creek basin, Colorado 1975-1979: U.S. Geological Survey Open-File Report, [in press March 1982].

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, SPRINGS, CLIMATE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SEDIMENT

Access Code: 002 Use Code: 01

A pre-development plan was designed to compile the environmental and technical data necessary to fully assess the resources and to determine the environmental impacts and economic costs associated with full development of oil shale production on the Naval Oil Shale Reserve No. 1, in the Parachute Creek drainage basin of Western Colorado. This report summarizes data collected by the Water Resources Division of the U.S. Geological Survey for the Department of Energy, Naval Petroleum and Oil Shale Reserves. It includes data from five surface water gages, two automatic sediment samplers and two water quality monitors. Sixty-three instantaneous streamflow measurements were made on reaches of Parachute Creek and its tributaries to determine gain or loss of flow. Thirteen springs and nine surface sites were sampled and chemical analyses of these sites are included. From 1975 to 1979, 88 spring sites were inventoried, and conductivity, temperature, pH and discharge were measured. Climatic data includes, maximum, minimum and total daily solar radiation. Daily total precipitation is reported for three stations and snow course data is reported for one site.

ABSTRACT

Accession Number:
@ 628
Patterson, J.L., and Somers, W.P., 1966, Magnitude and frequency of floods in the United States, part 9, Colorado River basin: U.S. Geological Survey Water-Supply Paper 1683, 475 p.

Contact: Public Inquiries Office (copy)

Key Categories: SURFACE WATER QUANTITY, FLOODS, UTAH, WYOMING, COLORADO

Access Code: 192 Use Code: 01

This report outlines methods by which the magnitude and frequency of expected floods of any recurrence interval from 1.1 to 50 years can be determined at most points in the Colorado River basin.

Composite frequency curves were drawn showing the relation of the mean annual flood to floods having recurrence intervals from 1.1 to 50 years. Other curves express the relation of the mean annual flood to basin characteristics. In the northern part of the basin (north of about lat 37° N.) both drainage area and mean altitude were important factors influencing the magnitude of the mean annual flood. Only drainage area was used as an independent variable in the southern part of the basin.

By combining data from the composite frequency curves and curves showing the relation of the mean annual flood to basin characteristics, flood-frequency curves can be drawn for streams in the report area not materially affected by regulation or diversion within the range and recurrence interval defined by base data.

Some of the larger streams in the basin do not lend themselves to regional analysis. These streams are given special treatment in this report. Owing to the paucity of streamflow data, flood-frequency relations are not defined in some of the more arid parts of the report area.

ABSTRACT

Accession Number:
@ 628.1
Patton, P.C., and Schumm, S.A., 1975, Gully erosion, northwestern Colorado: a threshold phenomenon: in Geology, v. 3, p. 88-90.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, SEDIMENT

Access Code: 002 Use Code: 01

The widespread occurrence of discontinuous gullies in the oil-shale region of northwestern Colorado is of particular concern because of the resulting progressive destruction of the valley floors. Furthermore, the integration of a semi-arid drainage network can cause a rapid increase in the sediment yield of the basin, with subsequent harmful effects downstream.

Field work in the Piceance Creek and Yellow Creek drainage basins indicates that these discontinuous gullies developed on oversteepened segments of the valley floors. Although the critical slope of entrenchment is probably related to magnitude of run-off, discharge measurements were not available; therefore, drainage-basin area was selected as the most representative measure of discharge. An inverse relation between drainage-basin area and critical slope of entrenchment applies, and the lower limit of scatter of the data establishes a critical slope-area relation, which can be used to identify potentially unstable valley floors. This relation can be used to determine areas of instability where preventive measures can most economically and successfully be undertaken.

ABSTRACT

Accession Number:
@ 629
Pearl, R.H., 1974, Geology of ground-water resources in Colorado, an introduction: Colorado Geological Survey Special Publication 4, Denver, CO., 47 p.

Contact: USGS Library (loan)

Key Categories: GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 03

This report describes, in summary form, the ground-water resources of Colorado. Its purpose is to give a nontechnical presentation of factual information about the hydrogeological conditions of Colorado. The ground-water resources of Colorado are discussed and presented in maps and tables in relation to water quantity, quality, and distribution as related to the various geographic regions of the State.

Due to over appropriation of surface-water supplies and rapid urban growth in many areas of Colorado which do not have adequate surface-water supplies, more and more usage is being made of ground-water in the state. Thus, Colorado's ground-water resources are becoming increasingly important with their development continuing at a fast pace.

ABSTRACT

Accession Number:
@ 630
Pearl, R.H., 1971, Bibliography of hydrogeologic reports in Colorado:
Colorado Geological Survey Bulletin 33, 39 p.

Contact: none

Key Categories: COLORADO, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, BIBLIOGRAPHY

Access Code: 011 Use Code:

This bibliography comprises all known published and unpublished public reports on ground-water conditions in Colorado through 1970. The report is in three alphabetical sections, bibliography, subject index, and miscellaneous papers. The bibliography section is a listing of the various authors, while the subject index lists the different counties and subjects with the respective authors. The miscellaneous paper section lists those papers pertaining to subjects not otherwise listed under the counties.

ABSTRACT

Accession Number:
@ 631
Pearson, F., Diyamandoglu, V., Nurdogan, Y., Wong, S., and Selleck, R., Dec. 1980, Stream stripping of shale oil wastewater - phase I: Sanitary Engineering Research Laboratory, University of California, Berkeley, Rep. UCB-SERL 80-8, 78 p.

Contact: Gloria Gill - LBL (copy)

Key Categories: IN-SITU, EFFLUENTS

Access Code: 011 Use Code: 02

A preliminary investigation was conducted into the steam stripping process for removal of ammonia, alkalinity and some organics from shale oil gas condensate and retort water. This work was primarily directed towards establishing the minimum steam-to-water ratio necessary for a target 95% removal of ammonia from shale oil wastewater. Results of batch experiments indicated that a ratio of approximately 0.12 would achieve 95% removal of ammonia, while the steam-to-water ratio for 95% removal of a continuous flow pilot stripper was 0.4. While specified removals of ammonia and other contaminants in continuous flow units can be expected to require a somewhat higher steam-to-water ratio than for batch units, it is reasonable to expect that an improved continuous flow stripper design proposed would require a lower steam-to-water ratio than that obtained in this investigation.

ABSTRACT

Accession Number:
@ 631.1
Pellizzari, E.D., Jan. 1978, Identification of components of energy-related wastes and effluents: final report, Research Triangle Institute, Durham, North Carolina, Rep. PB-280203, 525 p.

Contact: NTIS (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 002 Use Code: 01

A state-of-the-art review on the characterization of organic and elemental substances in energy-related liquid and solid effluents was conducted. Previous and on-going research programs and reports were reviewed to summarize the existing and probable future data on chemical elements and organic compounds in solid waste and aqueous effluents from (a) coal liquefaction and gasification plants, (b) coal-fired power plants, (c) oil-shale processors, (d) oil refineries, (3) coal mines and (f) geothermal energy. The reliability of existing information and the probability of accumulation of adequate data from current and past contracts and projects was evaluated according to preselected criteria. Based upon the absence of adequate data on the composition of energy samples, a chemical characterization progress was conducted for several energy-related processes. The necessary preconcentrations and purification were performed on these samples and the volatile and semi-volatile organic compounds were identified and quantified. Samples for organic and mercury analysis were subjected to a single analytical protocol in each case to permit comparison among samples. Organic constituents were analyzed by gas chromatography/mass spectrometry/computer and elemental components were determined and measured by spark-source mass spectrometry for all the elements in the periodic chart through uranium except oxygen, helium, hydrogen, neon, krypton, xenon, radon, nitrogen and carbon. The analysis of mercury was performed by flameless atomic absorption spectrophotometry.

ABSTRACT

Accession Number:
@ 631.2
Pellizzari, E.D., and Castillo, N.P., 1979, Organic constitutents of waters associated with coal and oil-shale conversion: in Symposium on potential health and environmental effects of synthetic fossil fuel technologies, Rep. CONF-780903, 57-69 p.

Contact: NTIS (copy)

Key Categories: IN-SITU, EFFLUENTS

Access Code: 002 Use Code: 02

Volatile (purgeable) and semivolatile (extractable) organic constituents were analyzed and compared in aqueous samples from in situ and low-Btu coal gasification processes and from in situ oil-shale retorting experiments. Qualitative and quantitative information was obtained using glass capillary gas chromatography combined with computerized mass spectrometry. Many oxygen-, nitrogen-, and sulfur-containing compounds were detected and qualitative and quantitative differences were observed among the processes. The transport of volatile and water-soluble organics away from the burn zone after in situ coal gasification was demonstrated for the Felix II coal seam in Gillette, Wy.

ABSTRACT

Accession Number:
@ 632
Pelton, V.C., and Smith, V.E., 1977, Climatic and snow course data output programs in the water resources data system: Wyoming Water Resources Research Institute Report, 78 p.

Contact: Wyoming Water Resources Research Institute (copy)

Key Categories: WYOMING, CLIMATE

Access Code: 152 Use Code: 02

The Water Resources Data System (WRDS) is a computerized system for storage, retrieval and analysis of surface water, water quality, climatic and snow course data. This report describes for climatic and snow course data the kinds of data stored, methods of retrieval, kinds of analyses, how users may obtain data and user costs on the current sytem.

ABSTRACT

Accession Number:
@ 633
Pennak, R.W., 1974, Limnological status of streams, Piceance Creek Basin, Rio Blanco and Garfield Counties, Colorado: ROSS-23, Boulder, Colorado, Thorne Ecological Institute, 50 p.

Contact: Colorado State Library (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, ENVIRONMENTAL

Access Code: 011 Use Code: 02

This report summarizes the results of an investigation to establish baseline biological conditions in streams of the Piceance Basin and associated areas of northwestern Colorado. The potential impacts of construction, homesites, commercial and support operations, and other developments associated with an oil shale industry are discussed.

Surface water quality and biological data were collected during five evenly spaced sampling trips between June and October, 1973. Eleven stations were established on Yellow, Corral, Piceance, Parachute, and Roan Creeks and on the White River. Water quality samples from these sites were analyzed for pH, bound CO_2, dissolved inorganic material, dissolved organic material, suspended inorganic material, suspended organic material, Cl, Na, SO_4, and CA. These data are summarized and discussed in this report.

ABSTRACT

Accession Number:
@ 633.1
Persoff, P., Hall, W.G., and Mathur, A.K., July 1979, Control technology for in-situ oil shale retorts: quarterly progress report for period April 1 - June 30, 1979, Lawrence Berkeley Laboratory Rep. LBID-091, 46 p.

Contact: Gloria Gill - LBL (copy)

Key Categories: IN-SITU, LEACHING, RECLAMATION, COLORADO, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 02

This is the progress report that summarizes work on the development of a kinetic model of the in situ leaching process and on methods to mitigate the leaching of abandoned in situ retorts. The report also provides a brief review of groundwater flow models developed by others, and it presents a good compilation of geohydrologic properties (useful in groundwater flow modeling) for the Piceance Basin.

ABSTRACT

Accession Number:
@ 633.2
Persoff, P., and Fox, J.P., 1979, Control strategies for abandoned in-situ oil shale retorts: Lawrence Berkeley Laboratory Rep. LBL-8780, 106 p.

Contact: Gloria Gill (copy)

Key Categories: RECLAMATION, IN-SITU

Access Code: 011 Use Code: 01

The purpose of this report is to identify control technologies which may prevent or mitigate certain environmental impacts that are unique to in-situ oil shale production. Literature from related areas (reservoir and civil engineering and deep coal mining) was consulted to answer as completely as possible unresolved technical questions associated with each candidate control technology. Where possible, approximate cost data are presented.

This study focuses on in-situ leaching and addresses subsidence and resource recovery as peripheral issues. Although the vertical modified in-situ process (VMIS) is emphasized, most of the control technologies discussed are equally applicable to other in-situ technologies such as horizontal modified in-situ retorting or true in-situ retorting. Only the oil shale resources in the Green River Formation are considered.

Prevention of groundwater pollution resulting from in-situ oil shale development will require a novel control technology. Based upon information available regarding the problem and related technologies, certain candidate control technologies appear technically and economically feasible. It appears possible to prevent pollution of groundwater for about \$0.59-\$0.67 per barrel by recovering leachate and treating it on the surface; for about \$0.74-\$2.85 per barrel by placing a grout curtain around an entire block of retorts; or for about \$0.35-\$1.30 per barrel by backfilling abandoned retorts with a grout of surface-retorted spent shale. Other control technologies studied--in-situ adsorption and ion exchange, and reversing wettability of spent shale--appear to be either too costly or they do not provide adequate protection.

ABSTRACT

Accession Number:
@ 634
Peters, H.H., Jan. 1980, Shale oil wastewater recovery by evaporation: Final report prepared by Resources Conservation Company, Seattle, Washington for Battelle Pacific Northwest Laboratory, Richland, Washington, 56 p.

Contact: Basil Mercer (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

This report summarizes the results of a study to evaluate evaporation as a method of reclaiming retort water. Evaporative characteristics of a Geokinetics retort water were determined in the laboratory by a series of batch boildown and distillation tests. These tests were conducted on nonpretreated feed, 200F air-sparged feed, and lime-treated feed followed by cold air sparging. The pretreatments used were selected to aid in stripping of carbon dioxide and ammonia from the water while maintaining a high pH. Evaporation parameters were developed and used to estimate the capital and operating costs of a two-million-gallon-per-day vapor compression evaporating system.

ABSTRACT

Accession Number:
@ 635
Peterson, E.J., Henicksman, A., and Wagner, P., 1981, Investigations of Occidental Oil Shale, Inc., retort 3E spent shales: Los Alamos Scientific Laboratory Rep. LA-8792-MS, 39 p.

Contact: Gene Peterson (copy)

Key Categories: LEACHING, IN-SITU

Access Code: 011 Use Code: 01

The mineralogy, trace element concentrations in the solids, and leaching characteristics of spent shales from retort 3E cores were studied. This is the first comprehensive study of *in situ* generated materials. Although there were unique aspects to the operations of retort 3E that are not representative of a commercial operation, the study of *in situ* generated materials has provided insights into the chemical, mineralogic, and solution reactions that occur during and subsequent to underground retorting. Characterization of the solid materials has verified that *in situ* processing occurs in a thermodynamic and kinetic regime not previously encountered for surface retorting. Carbonate decomposition and silication reactions that form high-temperature products, such as akermanite-gehlenite and diopside-augite solid solutions, have been identified by x-ray diffraction. Observations resulting from solids characterization are substantiated by leachate chemistry, which, although compatible with leachates generated from surface retorted materials, are different in extent (composition and concentration). Comparison of leachates generated from *in situ* materials with Multi-Media Environmental Goals/Minimum Acute Toxicity Effluent values indicates that the major and trace elements deserving further investigation are potassium, lithium, fluoride, vanadium, boron, molybdenum, nickel, and arsenic. Several trace elements, including fluoride, vanadium, boron, and arsenic, show increased mobilities from spent shales containing akermanite-gehlenite solid solutions as the major mineral phase. This report details the chemical, mineralogic, and solution behavior of major, minor, and trace elements in these materials.

ABSTRACT

Accession Number:
@ 635.1
Peterson, D.F., Crawford, A.B., eds., 1978, Values and choices in the development of the Colorado River basin: American Association for the Advancement of Science, Committee on Arid Lands, Washington, D.C., 337 p.

Contact: AAAS (copy)

Key Categories: PROCEEDINGS

Access Code: 002 Use Code: 02

The framework for the presentations in this book, divided into "historical perspectives" and "future directions", derives from a AAAS Symposium sponsored by the Association's committee on arid lands, San Francisco, 1974. As the arid southwest continues developing and changing, the Colorado River basin and its vast hydrocarbon fuel resources will increasingly be the subject of study. While the basin's mineral, agricultural, grazing, recreational, wilderness and archaeological resources will come under scrutiny. The use of all the basin's resources requires a readily available source of water which is, in this case, already completely used or in a transitional stage of use. While the Colorado may be unique in many ways, it is also typical of other arid region river basins experiencing increasing demands and transitional forces. Discussed here are the general characteristics of the basin that qualify it as a proper representative of arid zones undergoing similar transitional processes throughout the world.

ABSTRACT

Accession Number:
@ 635.2
Peterson, S.R., Jurinak, J.J., and Wagenet, R.J., 1980, Salt release from suspended sediments: Research Report 62, Utah Agricultural Experiment Station, Utah State University, Logan, UT.

Contact: Jeff Wagenet (copy)

Key Categories: UTAH, SALINITY, COMPUTER MODELS

Access Code: 002 Use Code: 01

The results of the sediment salt studies show that indeed suspended sediments can contribute, as a diffuse source, to the salt load of the Colorado River. Salt release from both a moderate and a high salinity sediment system was investigated in water of varying chemical quality. The rate at which soil was released from both sediment systems can be described by a simple general power function. A chemical kinetic model was developed which simulated both total salt and individual ion concentrations in solution with time. The model was successfully validated in laboratory studies. The kinetic model was coupled with an equilibrium model which calculated the degree of saturation which the contacting waters have attained with regard to 15 common salt bearing minerals found in the Upper Colorado River Basin.

ABSTRACT

Accession Number:
@ 635.3
Petsch, H.E., Jr., 1980, Streamflow statistical summaries for
Colorado streams through Sept. 30, 1975, v. 2: Colorado River basin
above Gunnison River: U.S. Geological Survey Open-File Report
79-1060, 350 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 01

This report contains statistical summaries of daily streamflow data as of September 30, 1975, for 189 stations west of the Continental Divide in Colorado for use by agencies and individuals engaged in water studies. To be included in this report, a station had to have a minimum of 3 complete water years (October 1 to September 30) of record and 3 complete climatic years (April 1 to March 31) of record having virtually constant effects of regulation and diversion, and to have had streamflow records previously reviewed and published by the U.S. Geological Survey.

Duration tables show the distribution of daily discharges for each water year ending September 30. High-flow sequence tables show the highest mean discharge for 1, 3, 7, 15, 30, 60, 90, 120, and 183 consecutive days of each water year. Low-flow sequence tables show the lowest mean discharge for 1, 3, 7, 14, 30, 60, 90, 120, and 183 consecutive days of each climatic year. For monthly flows the following statistics have been computed for each station having 5 or more complete water years of record: (1) Mean, (2) variance, (3) standard deviation, (4) skewness, (5) coefficient of variation, and (6) percentage of average flow. The first five items were also computed for the water year annual flows along with the first order serial correlation coefficient. For stations which have had virtually instantaneous significant changes in the effects of regulation or diversion, a maximum of two sets of summaries are shown. Referenced reports describe procedures for processing and interpreting the streamflow statistics.

ABSTRACT

Accession Number:
@ 635.4
Pfeffer, F., June 1974, Pollutional problems and research needs for an oil shale industry: Rep. EPA-660/2-74-067, 36 p.

Contact: NTIS (copy)

Key Categories: COLORADO, ENVIRONMENTAL, WYOMING, UTAH

Access Code: 002 Use Code: 03

The oil shale resources and surface stream drainage within the green river formation of Colorado, Utah, and Wyoming are presented briefly. The aboveground retorting process of the Bureau of Mines, Union Oil Company, and the Oil Shale Corporation are described, as are the physical and leaching characteristics of spent shale residues derived from each process. Oil shale retorting in place is summarized. The area of major concern, stabilization of spent shale residues, is covered in detail. Other area of environmental concern are discussed: retort waste water, process water from shale-oil upgrading, dewatering operations, mineral recovery, and contamination of groundwater by raidoactivity. Research needs are presented: a Tri-State Groundwater Report; Environmental Base Line Data; And Assessement of Total Environmental Impact; Pollution Control Guidelines: Effluent Limitations: and continuous EPA monitoring.

ABSTRACT

Accession Number:
@ 636
Pimentel, K.D., Stuermer, D.H., and Moody, M.M., 1980 Sampling strategies in groundwater transport and fate studies for in situ oil shale retorting: in Oil Shale Symposium, Sampling, Analysis and Quality Assurance, March 1979, EPA-600/9-80-022, p. 286.

Contact: Ken Pimentel (copy)

Key Categories: GROUNDWATER QUALITY, COLORADO, COMPUTER MODELS

Access Code: 011 Use Code: 03

This paper proposes a new concept for designing groundwater monitoring programs to assess the effects of in situ oil shale retorting. The concept includes new ways to characterize pollution source terms, build and calibrate hydrological models, estimate stochastic systems, and optimize measurement system designs. The solution to the monitoring problem would be the minimum-cost program that estimates pollutant concentrations throughout the groundwater region within an acceptable error criterion. That program would specify the lowest number of wells that need to be drilled, their best locations and depths, and how seldom they need by sampled. The approach can be applied to meet differing requirements of characterizing regional hydrology, studying geochemistry, determining pollutant transport and fate, and designing monitoring networks to demonstrate compliance with effluent regulations.

ABSTRACT

Accession Number:
@ 636.1
Plotkin, S.E., Gold, H., and White, I.L., Feb. 1979, Water and energy in the Western coal lands: Water Resources Bulletin, v. 15, no. 1, p. 94-107.

Contact: Denver Public Library (copy)

Key Categories: COLORADO, WYOMING, UTAH, PRESENT WATER USE

Access Code: 002 Use Code: 02

Problems of water quality and quantity are critical to development of the energy resources of the Western U.S. Based on a number of independent measures, the Upper Colorado River basin is expected to experience severe water availability problems in a few decades if projected energy and agricultural development occurs. Given the impending collision between the competing interests of various water users, water resource management and conservation deserve the utmost attention. Substantial opportunities for conservation exist in energy and agricultural development. Selection of both conversion and cooling technologies and careful siting decisions can sharply reduce the water requirements of energy development. Agricultural water conservation strategies include improving irrigation and cultivation practices, removing phreatophytes, removing marginal lands from production, and changing crop patterns. In order to accomplish significant conservation, there must be changes in those aspects of water law that remove conservation incentives from the water use system.

ABSTRACT

Accession Number:
@ 636.2
Ponce, S.L., and Hawkins, R.H., Oct. 1978, Salt pickup by overland flow in the Price River basin, Utah: Water Resources Bulletin, v. 14, n. 5, p. 1187-1200.

Contact: Denver Public Library (loan)

Key Categories: UTAH, SALINITY

Access Code: 002 Use Code: 02

Described is a field investigation of diffuse source contributions in the Price River Basin to determine the processes involving salt pickup associated with overland flow. Results obtained were used in the development of a nonpoint source loading function to predict salt production from diffuse sources as a function of overland flow from the Mancos Shale Lands of the Price River Basin. Data exhibited a high degree of natural variation which procluded the separation of factors affecting salt loading; a simplistic nonpoint loading function was developed on empirical concepts and fitted to the data. Application of this function revealed that even under severe conditions, the average annual salt yield to the Price River from overland flow was relatively minor. Nevertheless, attention is called to the fact that these results pertain only to salt concentration of runoff water prior to entering rills and other small micro-channels.

ABSTRACT

Accession Number:
@ 637
Ponce, S.L., and others, Aug. 1976, Surface runoff and its effect on diffuse salt production from Mancos shale members, Watershed Management, Proceedings, Irrigation and Drainage Division, American Society of Civil Engineers, Logan, Utah, p. 140-168.

Contact: Denver Public Library (loan)

Key Categories: UTAH, SALINITY

Access Code: 002 Use Code: 02

A study was done within the Price River Basin and results indicated that alluvial deposits very near the channel of a perennial stream tend to yield runoff water of high salinity. The Blue Gate and Mancos undivided shale members are the prime salt producers in the basin. No simple relation was found between soil salinity and salinity of the runoff water over the soil. A slight correlation was noted between geologic type and the ratio of surface runoff to precipitation, while hydrologic soil-complex numbers showed no distinct separation between types. Strong linear relations exist between electrical conductivity and CA(++) and SO4 (--), while poor correlations exist between the ratio of surface runoff to precipitation and surface runoff to total solids for runoff from the Mancos members.

ABSTRACT

Accession Number:
@ 637.1
Post, F.J., Messer, J.J., and Lamarra, V., 1981, Guidelines for balancing the benefits of oil and gas development against environmental protection: in Utah Water Research Laboratory annual report for 1981, General Series UWRL/G-81/02, p. 78.

Contact: Fred Post (status)

Key Categories: UTAH, ENVIRONMENTAL, BIBLIOGRAPHY

Access Code: 002 Use Code: 01

The goal of this research is to produce a document that provides an orderly and systematic procedure that will facilitate assessment of water-related environmental impacts from fossil fuel extraction and processing.

An impact matrix has been developed for the assessment of water quality and aquatic environmental impacts associated with different levels and types of fossil fuel development activities. Such activities include extraction methods at surface and underground mines, ancillary and reclamation activities and conversion processes for the three fossil fuels examined -- coal, oil shale, and tar sands.

An extensive bibliography of studies related to each development activity is being compiled. These studies are located by computerized searches through data bases of government documents, scientific journals, symposium proceedings, and doctoral theses; through contacts with state and federal agencies dealing with management of the Upper Colorado River Basin; and through contacts with the energy industries and academic personnel.

ABSTRACT

Accession Number:
@ 638
Poulson, R.E., Smith, J.W., Young, N.B., Robb, W.A., and Speading, T.J., Jan. 1977, Minor elements in oil shale and oil-shale products: Rep. LERC/RI-77/1, Laramie Energy Research Center, ERDA, Laramie, WY, 17 p.

Contact: Dick Poulson (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

Accurate analyses of oil shale and its products are important in perfecting control technology for a developing industry and in anticipation of a need for effluent regulation. Both organic and inorganic compounds are of concern, but this paper is limited to elemental analyses without regard to particular chemical compounds. Order of magnitude minor elemental analyses for several Green River Formation oil shales, shale oils, and retort waters are presented. The oil-shale analyses show a remarkable uniformity between Colorado Piceance Creek Basin Mahogany Zone and Saline Zone oil shales. Comparison with earlier data of other workers extends this uniformity to rich and lean Mahogany zone oil shales, to the Mahogany and R-4 zones of the Piceance Creek (Colorado) and Uinta (Utah) Basins.

Crude shale oils and retort waters show variations in trace elements of up to 10^4 times even in products from nominally very similar retorting runs. The cause of such variations could not be determined from the data. Possible important variables, postulated but not yet evaluated, are heterogeneity in the oil shale, subtle differences in retorting processes, or special external influences, on the products after retorting.

Variations in survey type analyses are shown to be larger than expected, but the survey analysis with only order of magnitude precision is shown useful in delineating potential problems. The expected gain from more precise analyses is shown to be with respect to differentiating the causes of product variability in oil shale retorting. Suggestions for further work are presented.

ABSTRACT

Accession Number:
@ 638.1
Prewitt, C.G., Voos, K.A., and Waddle, T., 1981, Completion report - IFG study of physical-chemical habitat conditions on the Green and Colorado Rivers in Colorado and Utah: Cooperative Instream Flow Service Group, U.S. Gish and Wildlife Service, Fort Collins, CO, 44 p.

Contact: Instream Flow and Aquatic Systems Group (copy)

Key Categories: COLORADO, UTAH, COMPUTER MODELS, SURFACE WATER QUALITY

Access Code: 011 Use Code: 01

This report describes the use of the U.S. Fish and Wildlife instream water temperature model (Theurer, 1982) for studying temperature regimes of the Upper Colorado River Basin. The stream network studied included 15 U.S. Geological Survey streamflow gages along the Yampa River, White River, Green River, and Colorado River. Data for ten of these gages provided intitial conditions for the physical-process portion of the model. The other five are interior network gages that were used to validate and calibrate the model.

ABSTRACT

Accession Number:
@ 639
Price, D., and others, 1979, Ground-water conditions in Utah, spring of 1979: Utah Dept. of Natural Resources, Cooperative-Investigations Report No. 18, 68 p.

Contact: Utah Division of Water Resources (copy)
USGS - Salt Lake City (copy)

Key Categories: UTAH, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 03

This is the sixteenth in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow.

The report includes individual discussions of selected major areas of groundwater withdrawals in the State for the calendar year 1978. Water-level fluctuations, however, are described for the period spring 1978 to spring 1979.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-78. Other information that encompasses the study area is combined with data from other parts of the State.

ABSTRACT

Accession Number:
@ 640
Price, D., and Arnow, T., 1974, Summary appraisals of the Nation's ground-water resources--Upper Colorado Region: U.S. Geological Survey Professional Paper 813-C.

Contact: Public Inquiries Office (copy)

Key Categories: GROUNDWATER QUANTITY, GROUNDWATER QUALITY, COLORADO, WYOMING

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 641
Price, D., and Miller, L.L., 1975, Hydrologic reconnaissance of the southern Uinta Basin, Utah and Colorado: Utah Department of Natural Resources, Technical Publication No. 49, 66 p.

Contact: Utah Division of Water Rights (copy)
USGS - Salt Lake City (copy)

Key Categories: UTAH, CLIMATE, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SPRINGS

Access Code: 011 Use Code: 01

This report presents a summary of the hydrologic environment of the southern Uintah Basin. Stream gage stations, wells, springs, and climatological stations which provide the data base for the study are located on maps included with the report. Other figures, tables, and maps included in the report show geologic features, average monthly streamflows, the magnitude and frequency of annual peak discharges, average monthly precipitation amounts and temperatures, piezometric levels, and spatial variations in ground water quality.

The report includes sections on physiography, geology, climate, vegetation, and ground and surface water occurrence and quality. Discussions of the relationships among geology, surface water, and ground water provide insight into the regional hydrologic regime.

ABSTRACT

Accession Number:
@ 642
Price, D., and Waddell, K.M., 1973, Selected hydrologic data in the Upper Colorado River basin: U.S. Geological Survey, Hydrologic Investigations Atlas HA-477, 2 sheets.

Contact: Public Inquiries Office (copy)

Key Categories: AVAILABLE WATER BY BASIN, PRESENT WATER USE, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, COLORADO, WYOMING, UTAH

Access Code: 011 Use Code: 02

This hydrologic atlas consists of two sheets which summarize hydrology and water quality information for the Upper Colorado River basin. Most of the information in this atlas pertains to groundwater resources. The maps are highly generalized and are intended to provide the user with a general understanding of the geology, groundwater conditions, and water quality within the region. References are provided to refer the reader to more detailed information.

The first sheet summarizes information on the geohydrologic units, physiography and drainage, general availability of groundwater, utilization of groundwater, and groundwater storage. The quantity of groundwater used for irrigation, industrial supply, public supplies, and stock and domestic use is tabulated for each state within the Upper Basin. Various maps show the depth to groundwater, availability of groundwater, and other features.

The second sheet summarizes information on ground-and surface water quality. Separate maps show the location of areas of large quantities of saline groundwater, the average total dissolved solids content in water from principal aquifers in the Upper Basin, and selected chemical analyses of waters from 16 wells throughout the basin. Two other maps display the average concentration of total dissolved solids and sulfate in surface waters of the Upper Basin.

ABSTRACT

Accession Number:
@ 643
Price, W.E., Jr., 1981, Water-resources investigations of the U.S. Geological Survey in Colorado--fiscal year 1981: U.S. Geological Survey Open-File Report 81-150, 131 p.

Contact: Lucy Laughlin (copy)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SPRINGS

Access Code: 011 Use Code: 01

Water-resources investigations of the U.S. Geological Survey in Colorado consist of collecting water-resources data and conducting interpretive hydrologic investigations. The water-resources data and the results of the investigations are published or released by either the U.S. Geological Survey or by cooperating agencies. This report describes the water-resources investigations in Colorado for the 1981 fiscal year (October 1, 1980, to September 30, 1981).

ABSTRACT

Accession Number:
@ 644
Prien, C.H., Schmidt-Collerus, J.J., Pressey, R.E., Habenicht, C.H., Gala, K., Cotter, J.E., Powell, D.J., and Sung, R., Jan. 1977, Preliminary environmental assessment, sampling and analysis procedures: Paraho demonstration retort: v. II, Denver Research Institute, Denver, Colorado, 292 p.

Contact: Phyllis Fox (loan)

Key Categories: LEACHING, EFFLUENTS, SURFACE

Access Code: 011 Use Code: 02

This report presents the analytical methods and some of the analytic data from a field study conducted by TRW at the Paraho pilot and semi-works retort. The Paraho retorts are described, and procedures to collect and analyze gaseous, liquid and solid samples are reported. The report contains a good section on the organics present in Paraho raw and spent shales. It tabulates benzene and water extractables and individual compound analyses in several samples. Other sections present analyses of Paraho condensate and retort waters, spent shales, particulates, and gas samples.

ABSTRACT

Accession Number:
@ 645
Prindle, D.F., Aug. 1981, Shale oil, water, and the politics of ambiguity: first draft, University of Texas at Austin, 42 p.

Contact: David Prindle (copy)

Key Categories: COLORADO, WATER LAW, AVAILABLE WATER BY BASIN, PROCESS WATER USE.

Access Code: 011 Use Code: 03

This paper argues that the national discussion of oil shale is taking place in an atmosphere of ambiguity. Caught up in the problem of shale are a host of fundamental questions dealing with technology, economics, and politics. Despite the fact that tens of millions of dollars have been spent to try to answer these questions, as of the summer of 1981 most of them remain unresolved.

This paper examines the ways that ambiguity affects the political process that surrounds shale oil and water.

The paper overviews and interprets available literature on problems facing the oil shale industry, water supply, water pollution, political conflict, and Colorado policy.

ABSTRACT

Accession Number:
@ 646
Probstein, R.F., and Gold, H., 1978, Water in synthetic fuel production: The technology and alternatives: Cambridge, Mass., M.I.T. Press, 296 p.

Contact: Harris Gold (copy)

Key Categories: PROCESS WATER USE, SURFACE, IN-SITU

Access Code: 011 Use Code: 01

This book examines the synthetic fuel technologies which include the conversion of coal to clean gaseous, liquid, and solid fuels, and the conversion of oil shale to clean liquid fuels. A number of processes are described for each conversion, including both above ground and in situ (underground) procedures. For purposes of comparing water requirements, water treatment plants, and residuals generated, detailed conceptual designs for integrated miniplant complexes are presented for representative conversion processes. The discussion is presented under headings: general considerations; coal and shale conversion fundamentals; cooling fundamentals; gas production; liquid and solid fuel production; mining, disposal, and other water uses, water treatment; resources and water requirements.

ABSTRACT

Accession Number:
@ 647
Probstein, R.F., and others, 1974, Water needs for fuel-to-fuel conversion processes: paper presented at the Symposium on Water management for energy intensive industries, Washington, D.C., Dec. 3, 1974, Cambridge, Mass., Water Purification Associates, 35 p.

Contact: Harris Gold (copy)

Key Categories: PROCESS WATER USE, SURFACE

Access Code: 011 Use Code: 03

The present paper summarizes some results obtained on the identification and quantification of the influent and effluent water streams for the major fuel-to fuel conversion processes including the production of pipeline and power gas from coal, oil from shale, and oil from coal by hydrogenation. Emphasis is placed on the process stream requirements and process condensate or liquor effluent. Estimates are also given on water evaporated for cooling and cooling tower blowdown. The water requirements associated with mining, raw fuel preparation, spent fuel disposal and land reclamation are presented only briefly as lumped estimates for a few exemplary cases. It is concluded that although a large amount of water is required for the various fuel-to-fuel conversion processes, present estimates appear excessive. It is also concluded that water needs for cooling, mining and other procedures unrelated to the conversion processes can and should be minimized in water-short areas; that process effluents should be treated and roused within the plant boundaries as boiler feed; and that determinations should be made of how to utilize less usual brackish ground and surface water as plant feed.

ABSTRACT

Accession Number:
@ 647.1
Quan, D.A., Dec. 1973, Application of the Main II water forecasting system to Wyoming communities: M.S. Thesis, University of Wyoming, Laramie, WY, 50 p.

Contact: NTIS (copy)

Key Categories: WYOMING, PRESENT WATER USE

Access Code: 002 Use Code: 02

Reported is a project which tested the applicability of the MAIN II (Municipal and Industrial Needs) water forcasting system to five Wyoming, fairly typical, western communities: Cheyenne, Casper, Glenrock, Rock Springs, and Green River. MAIN II is a complex computer program that applies a number of equations to forecasting water demands and a library of water usage coefficients; for estimating water requirements, it employs mathematical models, unit use coefficients, and per capital coefficients. Three optional MAIN II projection methods were tested: internal growth modeling, historical extrapolation of data, and external projection. Results showed the latter two methods to be fairly reliable. The internal growth models were not representative of Wyoming cities due to the a typical growth patterns of Wyoming communities as compared to those of the nation as a whole. Wyoming communities obtain their new water supplies from groundwater sources or by purchasing agricultural surface water rights from streams. The incremental cost for new water is considerable, and financially, therefore, it is vital to the community to be able to forecast water demands in advance of the needs as accurately as possible.

ABSTRACT

Accession Number:
@ 648
Radosevich, G.E., 1977, Colorado water laws: Colorado State University, Dept. of Economics, Fort Collins, Colorado, [updates].

Contact: DRI (loan)

Key Categories: COLORADO, WATER LAW

Access Code: 000 Use Code: 01

ABSTRACT

Accession Number:
@ 648.1
Radosevich, G.E., Skogerboe, G.V., McWhorter, D.B., and Walker, W.R., July 1977, Salinity management alternatives for oil shale water supplies: Natural Resources Journal, v. 17, no. 3, p. 461-475.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, UTAH, WYOMING, SALINITY, ENVIRONMENTAL, LEACHING, SURFACE

Access Code: 002 Use Code: 02

Considerable attention has been given recently to the problem of salinity in the Colorado River. Increasing salinity concentrations are threatening the utility of water resources in the downstream areas of Arizona, California, and the Republic of Mexico. At the same time, the upper Colorado River basin, because of its vast reserves of oil shale and near-surface coal, is becoming one of the most important areas in the United States for energy development. However, energy development will also result in increased salinity levels in the Colorado River unless mitigating alternatives are employed. The principal problem regarding return flows from oil shale plants will occur as the result of processed shale waste disposal piles. Any water percolating through the waste piles will result in considerable salt pickup. Revegetation and proper irrigation will do much to alleviate surface and subsurface return flows. Other possibilities include desalinization or deep well injection. The basin-wide, non-degradation salinity policy for the lower stem of the Colorado River requires that each development, including oil shale mining, offset any salinity detriments by making improvements on-site or somewhere else in the Colorado River basin.

ABSTRACT

Accession Number:
@ 649
Radosevich, G.E., Allerdice, D., Kirkwood, C., and Noble, K.C., 1976, Evolution and administration of Colorado water law - 1876-1976: Littleton, Colorado, Water Resources Publications.

Contact: Water Resources Publications (copy)

Key Categories: WATER LAW, COLORADO

Access Code: 011 Use Code: 02

This book sets forths the highlights of the evolution and administration of Colorado water law. It includes chapters on the following topics: historical development and magnitude of water use; American water law doctrines; acquisition of water rights; the appropriation right; loss or impairment of water rights; rights and characteristics of classes of water; administration and adjudication of water rights; acquisition and administration of ground water rights; water conservation and water user organizations; environmental and recreational considerations; interstate aspects of Colorado water allocation and regulation; and key issues and trends.

ABSTRACT

Accession Number:
@ 650
Radosevich, G.E., and others, Feb. 1973, Economic, political, and legal aspects of Colorado water law: Fort Collins, Colorado, Colorado State University, Environmental Resources Center.

Contact: DRI (loan)

Key Categories: COLORADO, WATER LAW

Access Code: 042 Use Code: 03

This project traces the evolution of water law and related organizations, focusing upon changes that have occurred and the effects upon various water user groups. Specific emphasis was placed upon a determination of the use of technology in the legal process and upon identifying the sources and nature of political constraints that operate to restrict and/or facilitate changes in Colorado water law.

It is a general conclusion that, (1) Colorado depends upon its water supply for future prosperity, (2) the water law system taken in the aggregate provides an excellent basis for future water planning, (3) the state must shift from a "use orientation" to a "management orientation" treatment of its waters, (4) technology can and must play a more important role in future litigation and legislative formulation, and (5) the greatest constraints to changing Colorado water law lie with the people themselves.

ABSTRACT

Accession Number:
@ 651
Rajaram, V., Kauppila, T.A., and Bolmer, R.L., 1977, Oil shale mining and the environment: in Proceedings of the Second Pacific Chemical Engineering Congress, Vol I, American Institute of Chemical Engineers, New York, New York, p. 430.

Contact: AIChE (copy)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 03

Experimental mining of oil shale, to date, has been conducted only in the shallow Mahogany zone and has utilized only the room and pillar mining method. The U.S. Bureau of Mines is planning a demonstration mine in the deep, thick oil shale deposits in Colorado. This paper describes the four mining concepts that are planned for demonstration and the interrelationship of these concepts and the environment. The environmental aspects of oil shale development are also discussed.

ABSTRACT

Accession Number:
@ 652
Ramirez, W.F., 1980, Mathematical modeling and transport mechanisms for leaching of spent oil shale: in trace elements in oil shale University of Colorado Rep. DOE-10298-2, p. 142-162.

Contact: Bill Chappell (copy)

Key Categories: LEACHING, SURFACE, IN-SITU, COMPUTER MODELS

Access Code: 011 Use Code: 02

This is a first year progress report of a study to develop a mathematical model of surface and in situ spent shale leaching. This report focuses on the following preliminary laboratory studies: (1) characterization of pore size distributions, surface area and other properties of spent shales; (2) design and construction of an injection-controlled, dynamic leaching apparatus; and (3) determination of equilibrium exchange isotherms for SO_4, CO_3, Na, Ca, Sr, B, and F. The author proposed a mathematical model of the leaching process, based on preliminary data. It consisted of two equations, one applicable to the main channels in a packed bed of spent shale and the other applicable to the dead space.

ABSTRACT

Accession Number:
@ 652.1
Ramsey, W.J., Borg, I.Y., and Thornton, R.L., July 1978,
Institutional constraints and the potential for oil shale development: Lawrence Berkeley Laboratory Rep. UCRL-52468, 30 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 03

This report assesses the potential oil shale industry in the U.S., projects the degree of its importance, and examines the institutional constraints that inhibit its development. Oil shale industry constraints are divided into two categories--near-term and long-term. The principal near-term constraints are insurmountable environmental regulations and the concomitant unlikelihood of profits. It is believed the environmental questions can be dealt with satisfactorily and the costs of exploiting shale oil made acceptable. As for the long-term constraints, they are unavoidable. The most important one foreseen is availability of adequate amounts of water, both in terms of withdrawals from natural sources and in terms of storage capacity. Air pollution, water pollution, and population pressures are also matters of concern that must be reckoned with. While it is impossible to quantify the effects of long-term constraints precisely, it is estimated that a mature shale oil industry would produce 2.5 million bbl/day under the most likely set of circumstances. (In the unlikely event that near-term constraints reamin in effect, there will be no shale oil industry.) Under the most optimistic circumstances, the industry might produce 6.5 million bbl/day. In order for that to happen, however, some very large water-policy decisions would have to be made and other constraints would have to be removed or sharply modified.

ABSTRACT

Accession Number:
@ 652.2
Rango, A., and Martinec, J., 1979, Application of a snowmelt-runoff model using Landsat Data: Nordic Hydrology, v. 10, n. 4, p. 225-238.

Contact: Denver Public Library (loan)

Key Categories: WYOMING, COMPUTER MODELS, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

The snowmelt-runoff model developed by Martinec has been used to simulate daily streamflow on the 228 sq km Dinwoody Creek Basin in Wyoming, using snowcover extent from LANDSAT and conventionally measured temperature and precipitation. For the six-month snowmelt seasons of 1976 and 1974, the simulated seasonal runoff volumes were with 5% and 1%, respectively, of the measured runoff. Also, the daily fluctuations of discharge were simulated to a high degree by the model. Thus far the limiting basin size for applying the model has not been reached, and improvements can be expected if the hydrometeorological data can be obtained from a station inside the basin. LANDSAT provides an efficient way to obtain the critical snowcover input parameter required by the model.

ABSTRACT

Accession Number:
@ 653
Rankl, J.G., and Barker, D.S., 1977, Rainfall and runoff data from small basins in Wyoming: U.S. Geological Survey Open-File Report (also published as Wyoming Water Planning Program Report No. 17), 195 p.

Contact: Edward Cox (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY, CLIMATE

Access Code: 011 Use Code: 02

Data for 392 rainfall and runoff occurrences are tabulated in this report. The data were collected from 1965 to 1973 for small, ephemeral streams having drainage areas of less than 11 square miles. Precipitation and discharge data, in 5-minute increments, are given for 392 flow events in 22 small drainage basins in Wyoming.

Only one of these 22 small drainage basins is within the Green River Basin. This station, Mud Springs Hollow near Church Butte, and Lyman, Wyoming, is on a tributary to Smith Fork of Blacks Fork. This station is west of the western boundary of Wyoming II.

ABSTRACT

Accession Number:
@ 653.1
Rao, B.K., Bowles, D.S., and Wagenet, R.J., 1980, Experimental and simulation studies of the growth of salt efflorescence in the Colorado River basin: Proceedings of the second inter-american conference on salinity and water management technology, Jaurez, Mexico.

Contact: Jeff Wagenet (copy)

Key Categories: SALINITY, UTAH, COMPUTER MODELS

Access Code: 002 Use Code: 01

Mechanisms related to efflorescence in the channel beds have been investigated in the field, in the laboratory, and by means of mathematical modeling. Two sites in the Price River Basin have been instrumented for moisture and salinity movement below the channel bed, and regular measurements of efflorescence growth were made. These field data and data collected from similar movements in instrumented soil columns in the laboratory were used to verify a mathematical model of water and solute flow in a soil column. A mathematical model of water and solute movement was developed and improved to replicate the 1) growth of efflorescence on the soil surface of the stream banks and bed, 2) effect of the efflorescence layer on evaporation from the soil surface, and 3) effect of more highly saline conditions than used for studies of irrigated agriculture. The model predicted water and salt concentration profiles and effluorecence densities satisfactorily.

ABSTRACT

Accession Number:
@ 654
Raphaelian, L.A., and Harrison, W., 1981, Organic constituents in process water from the in-situ retorting of oil from oil-shale kerogen: Argonne National Laboratory Rep. ANL/PAG-5, 33 p.

Contact: Mike Torpy (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 01

Capillary-column gas-chromatography/mass-spectrometry (GC/MS) was performed on the acid, base, and neutral fractions of liquid- and particulate-phase methylene chloride extracts of a composite sample of raw process water collected from separator Tank 6 by the Laramie Energy Technology Center. Of the 160 extractable and chromatographable organic compounds tentatively identified, the following compound classes were found (listed in decreasing order of abundance): quinolines and lower fatty acids, aminoindoles, neutral oxygenated heterocyclics, pyridines, pyrroles, pyrazoles, phenols, and alkanes. Noticeably absent or in low concentration were alkyl benzenes and alkenes. Assuming 100% extraction efficiency, these organics constitute approximately 0.035% of the retort water; approximately 50% of this amount is represented by the quinolines, fatty acids, aminoindoles, and oxygenated heterocyclics. The following differences were noted in the composition of the particulate and liquid extracts of the neutral and base fractions, respectively: (1) alkanes are a major portion of the particulates, whereas oxygenated heterocyclics are most prominent in the liquid; and (2) aminoindoles are only a minor portion of the particulates, but are prominent in the liquid phase. The concentration of a compound occurring in both the liquid and particulate extracts is approximately 40-100 times higher in the liquid than in the particulate extract.

ABSTRACT

Accession Number:
@ 654.1
Rasmussen, J.L., Feb. 1970, Atmospheric water balance and hydrology of the Upper Colorado River basin: Water Resources Research, v. 6, n. 1, p. 62-76.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 002 Use Code: 02

The atmospheric water balance over the Upper Colorado River is evaluated twice daily for the 7 winter seasons 1957-1963. The dry periods are shown to exhibit a seasonal trend in evaporation rate as well as decay of evaporation rate with time within periods. Duration is shown to be the dominant factor in storm yield and the occurrence of a few large storms delineates the relatively wet from the relatively dry winters. Finally, the wintertime accumulation of water over the basin and the resulting annual runoff are shown to be highly correlated.

ABSTRACT

Accession Number:
@ 655
Ratigan, J.L., 1980, User information manual, Subsid - a nonlinear two dimensional finite element program for static evaluation of mining subsidence: Lawrence Berkeley Laboratory Rep. LBL-11356.

Contact: Gloria Gill - LBL (copy)

Key Categories: SUBSIDENCE, IN-SITU,

Access Code: 011 Use Code: 01

Modified in situ (MIS) oil shale retorting may result in a number of environmental problems, including in situ leaching of the abandoned retorts, low resource recovery (large pillars are required to support the overburden), and subsidence. These problems may be mitigated by filling abandoned retorts with a grout that would fill the void space, thus improving retort structural strength and stiffness, and reducing retort permeability to groundwater flow. If sufficient strength and stiffness can be developed, it may be possible to design retorts so that the pillars can be retorted and resource recovery improved.

This document describes a computer program that was developed and used to evaluate the strength and stiffness required in a grouted retort to support the overburden and to improve resource recovery. The program SUBSID was developed to predict subsidence over a field of MIS retorts under various conditions of retort backfill. In MIS retorting the pillars between retorts form a continuous structure, separating individual retorts. This is the reverse of conventional room-and-pillar mining, where the pillars are discontinuous in a continuous row. SUBSID models either case in two dimensions.

ABSTRACT

Accession Number:
@ 656
Ratigan, J.L., and Goodman, R.E., Dec. 1980, Modeling of static mining subsidence in a nonlinear medium: presented at the Implementation of Computer Procedures and Stress-Strain Laws in Geotechnical Engineering Conference, Va. Polytechnic Institute, Blacksburg, VA, Aug. 3-6 1981, also published as Lawrence Berkeley Laboratory Rep. LBL-11896, 15 p.

Contact: Gloria Gill - LBL (copy)

Key Categories: SUBSIDENCE, IN-SITU

Access Code: 011 Use Code: 02

Applications of the conventional finite element method to problems of mining subsidence can result in excessive expense, particularly when nonlinear constitutive stress/strain relations are used for the geological medium. An alternative finite element method is proposed which captures the essential characteristics of subsidence observed both in more sophisticated finite element programs and in the field. The alternative method treats the overburden with classical beam theory with the inclusion of shearing deformation. The nonlinear axial response of the pillars as well as the nonlinear response of any backfill that may be present is also modelled. Flexural and bending modes of deformation are included for the pillar and backfill media with classical beam theory. Shearing deflections are also included for these structural members. The development of the constitutive relations, the implementation of the constitutive relations in the computer program and the numerical algorithm for the problem solution are presented.

An example problem is presented to illustrate the potential of the computer program. The problem evaluates subsidence over a block of abandoned in situ retorts with and without a grout backfill. The results of this study suggest that subsidence will not be an important issue for in situ retorting.

ABSTRACT

Accession Number:
@ 657
Rattien, S., and Eaton, D., 1976, Oil shale: the prospects and problems of an emerging energy industry: in Hollander, J.M., and Simmons, M.K., eds., Annual review of energy, Annual Reviews, Inc., Palo Alto, CA., 183-212 p.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL, SALINITY, PROCESS WATER USE, SURFACE, IN-SITU, AVAILABLE WATER BY BASIN

Access Code: 011 Use Code: 02

This review explores technological, economic, environmental, and institutional issues relating to the development of a commercial oil shale industry. The study discusses the energy potential of oil shale, reviewing the size of the resource, the proposed technology, and the economics of production. Environmental and developmental issues, including air quality, water quality, water supply and socioeconomic aspects, are discussed. The report presents estimates of salinity increases at Imperial Dam due to several oil shale development scenarios and tabulates estimates of water available for oil shale production in Colorado, Wyoming, and Utah, and summarizes estimates of water demands for oil shale development.

ABSTRACT

Accession Number:
@ 658
Redente, E., and Doerr, T.B., 1981, Revegetation research on oil shale materials: in Petersen, K.K., ed., Oil shale, the environmental challenges II, Golden, Colorado, Colorado School of Mines Press [in press 1982].

Contact: Kathy Petersen (status)

Key Categories: RECLAMATION, SURFACE

Access Code: 011 Use Code: 01

The objectives of this paper are to review existing information on revegetation and identify some of the existing needs and problems. Also an evaluation is made of the predictive capabilities associated with laboratory, field, and commercial operation studies. Finally, the basic roles and interactions of the research community, industry, and government are identified in order to improve communications and facilitate the use of research results.

This paper summarizes research through August 1981 on Union decarbonized, Union B, USBM, TOSCO II, and Paraho spent shale. The reviews focus on the type of treatments, i.e., soil cover, leaching, etc., that are required to establish growth and on the types of plant species that are suitable for revegetation.

ABSTRACT

Accession Number:
@ 659
Redente, E.F., and Cook, C.W., Feb. 1981, Revegetation research on oil shale lands in the Piceance Basin: Colorado State University Rep. COO-4018-5, 89 p.

Contact: Ed Redente (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 02

This report summarizes the results of research at Colorado State University on the revegetation of oil shale lands in Colorado. The report consists of a series of technical articles which summarize progress during the preceeding reporting period. The overall objective of this project is to study the effects of various reclamation practices on above- and below-ground ecosystem development associated with disturbed oil shale lands in northwestern Colorado.

The report covers the following topics: (1) soil microorganisms and methods of retorted shale reclamation; (2) effects of plant species, soil material, and cultural practices upon plant establishment and succession; (3) importance of fungi in revegetating disturbed soils and retorted shale; (4) long-term fertility of land drastically disturbed by oil shale development; (5) ecogenetic variability in native shrubs and the structure of natural communities as related to the reestablishment of vegetation on disturbed arid shrublands; and (6) selection of native grasses and legumes for improved rehabilitation.

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Denver, CO 80225

ABSTRACT

Accession Number:
@ 660
Redente, E.F., Ruzzo, W.J., Cook, C.W., and Berg, W.A., 1980, Retorted oil shale characteristics and reclamation: in Peterson, K.K., ed., Oil shale, the environmental challenges, Golden, Colorado, Colorado School of Mines Press, p. 169-191.

Contact: Ed Redente (copy)
Colorado School of Mines (copy)

Key Categories: RECLAMATION, SURFACE

Access Code: 011 Use Code: 01

This paper reviews reclamation studies using Colorado spent shales that had been conducted as of August 1980 and discusses research needs. It briefly reviews environmental problems associated with spent shale disposal and discussed reclamation objectives and approaches. The article summarizes characterization data for TOSCO, Paraho, and Union spent shales which are important in the reclamation of the materials, including soluble salt content, pH, the sodium adsorption ratio, and physical characteristics. The paper then reviews research that has been conducted on three major approaches to the reclamation of surface spent shales: (1) establishment of vegetation directly on spent shale; (2) establishment of vegetation on ameliorated spent shale (i.e., following leaching, fertilization, and irrigation); and (3) establishment of vegetation on soil over spent shale.

ABSTRACT

Accession Number:
@ 661
Reed, J.E., Bedinger, M.S., and Terry, J.E., 1976, Simulation procedure for modeling transient water-table and artesian stress and response: U.S. Geological Survey Open-File Report 76-792, 173 p.

Contact: Open-File Services Section

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 02

The series of computer programs described in this report were designed specifically to model the ground-water regime in sufficient detail to determine the effects of the imposition of various types of stress upon the system, and to display the results in a convenient manner during calibration and when presenting projected data.

SUPERMOCK simulates the ground-water system and DATE and HYDROG aid in the display of computed data. During calibration, DATE is especially useful because it has the optional feature of comparing computed data with observed data. Although the programs can be run independently, experience dictates that for best results the three should be run as steps in the same job.

English units of inches, feet, and days are used in each of the programs. The units for any parameters not given in the text are clearly specified in the instructions for input to the individual programs.

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P.O. Box 25047
Denver, CO 80225

ABSTRACT

Accession Number:
@ 662
Reid, J.K., Carroon, L.E., and Pyper, G.E., 1968, Extensions of streamflow records in Utah: Utah Dept of Natural Resources, Technical Publication No. 20, 110 p.

Contact: Utah Division of Water Rights (copy)
USGS - Salt Lake City (copy)

Key Categories: SURFACE WATER QUANTITY, UTAH

Access Code: 011 Use Code: 01

This report provides long-term data on streamflow at selected short-term gaging stations in Utah. The records of streamflow at the short-term or secondary gaging stations are extended on the basis of a graphical correlation with concurrent records at long-term or primary gaging stations. The data presented consist of records of runoff at the short-term stations summarized on a monthly and yearly basis; these data include the actual short-term records and the correlative estimates of runoff. Methods and information are included to enable the reader to make further extensions of runoff records.

The standard error of estimate for correlations used is 30 percent or less, and the coefficient of correlation is at least 0.8. Streamflow information is thereby obtained that is believed to be more representative of the long-term runoff than is an actual short-term record.

This study shows that the optimum period of concurrent record needed in Utah for a reliable correlation is about 15-20 years. Extensions of record for low-flow and flood-frequency studies usually cannot be obtained from correlations. Much of this information could be collected economically by converting short-term stream-gaging stations to partial-record stations after a satisfactory correlation with a long-term station has been obtained.

ABSTRACT

Accession Number:
@ 662.1
Repplier, F.N., Healy, F.C., Collins, D.B., and Longmire, P.A., 1981
Atlas of groundwater quality in Colorado: Colorado Geological Survey, Map Series no. 16, 7 plates.

Contact: Colorado Geological Survey (copy)

Key Categories: COLORADO, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 02

This map series was prepared as part of the Underground Injection Control Program. It consists of a series of hydrogeological maps and cross sections depicting the conditions of all aquifers in Colorado found at a depth of less than 2,000 feet below the surface and whose water contain less than 10,000 mg/l TDS.

The series consists of seven plates. The first plate describes the study, lists the 88 references used to compile the maps and presents tables which describe the geologic units and their hydrologic properties for the eastern and western portions of Colorado. Plates 2-6 which cover different sections of the State, present maps which show formation boundaries, outcrops, and TDS contours for different structural basins within each region. Plate 7 summarizes the stratigraphy for eastern and western Colorado and presents a 1:500,000 map of the state which shows well locations and average TDS concentrations. Plate 5, which covers the Colorado oil shale basin includes TDS contour maps for the upper and lower aquifers and a north-south stratigraphic cross section of the Piceance Basin.

ABSTRACT

Accession Number:
@ 663

Reynolds, J.P., McCarthy, W.N. Jr., and Theodore, L., 1981,
Environmental and economic considerations in energy utilization: in proceedings of the Seventh National Conference on Energy and the Environment, Phoenix, Arizona, Nov. 30 - Dec. 3, 1980.

Contact: Area Oil Shale Supervisor's Office (loan)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 663.1
Ribbens, R.W., 1976, River network program: in Clyde, C.G., Falkenborg, D.H., and Riley, J.P., eds., Colorado River basin modeling studies, Utah Water Research Laboratory, p. 175-215.

Contact: Utah Water Research Laboratory (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, COMPUTER MODELS

Access Code: 011 Use Code: 01

This program is a flow and salt accounting model. It permits operation of a river system, routing flows and salts through a system which can include reservoirs and a branching network. Reservoir operations are specified by the user. A basic time frame of one month is used.

The quality system (TDS) is treated as a conservative one. Thus, the precipitation and dissolution of salts are not explicitly simulated. They may be roughly accounted for by proper use of the water and salt inputs.

Input data include the system configuration; reservoir characteristics, parameters, initial conditions, evaporation rates, and operating criteria; upstream and downstream boundary inputs; water use inputs including import/exports, exports, irrigation, and variable exports whose magnitudes depend on the availability of water; and run and output options.

ABSTRACT

Accession Number:
@ 664
Richardson, E.A., 1971, Estimated return periods for short-duration precipitation in Utah: Utah State University, Dept. of Soils and Biometeorology Bulletin no. 1, 63 p.

Contact: USGS - Salt Lake City (loan)

Key Categories: CLIMATE, UTAH

Access Code: 002 Use Code: 02

This report presents estimated return periods for short-duration precipitation at several locations in the Utah oil shale basin: Trial Lake, Moon Lake, Hanna, Summit, Duchesne, Roosevelt, Dinosaur Quarry, Bonanza, Soldier Summit. This report presents return period tables for periods of 2, 5, 10, 25, 50, and 100 years and durations of 6 and 24 hours. These tables were developed from Soil Conservation Service maps of the same information using numerical techniques reported by Paul Kangieser (NOAA Technical Memorandum WBTM WR 44, 1969).

ABSTRACT

Accession Number:
@ 665
Richardson, E.A., Evaporation data for Utah: Utah State University,
National Weather Service, Logan, Utah..

Contact: BLM - Vernal (loan)

Key Categories: UTAH, CLIMATE

Access Code: 112 Use Code: 02

This report presents a brief discussion on the use of data from evaporimeters and their limitations. A list of evaporation stations in Utah is provided, together with the type of data (evaporation, wind movement, maximum water temperature, minimum water temperatures) and period of record for each. There are four stations in the Utah oil shale basin: Ft. Duchesne (4/43-9/69), Moon Lake (7/41-6/69), Myton (5/18-10/42), and Vernal (4/48-6/54). This report tabulates monthly evaporation for each station and for each year of record.

ABSTRACT

Accession Number:
@ 665.1
Richardson S.G., McKell, C.M., Nov. 1980, Salt tolerance of two saltbush species grown in processed oil shale: J. Range Management, v. 33, no. 6, 460-463 p.

Contact: Cyrus McKell (copy)

Key Categories: RECLAMATION, SURFACE

Access Code: 011 Use Code: 02

The tolerance of fourwing saltbush (*Atriplex canescens*) and cuneate saltbush (*Atriplex cuneata*) to the salts in processed oil shale was studied in a greenhouse experiment over a EC_e range of 4 to 38 mmho/cm. Growth responses differed, depending on the species and the particular salt or salts in the soil solution. Cuneate saltbush was more salt tolerant than fourwing saltbush, but both species survived and grew at salinities as high as 38 mmho/cm. Because of their high salt tolerance these saltbush species may be very important for use in the rehabilitation of processed oil shale disposal sites.

ABSTRACT

Accession Number:
@ 665.2
Riley, J.P., Bowles, D.S., Chadwick, D.G., and Grenney, W.J., Aug. 1979, Preliminary identification of Price River basin salt pick-up and transport processes: Water Resources Bulletin, v. 15, n. 4, p. 984-995.

Contact: Denver Public Library (loan)

Key Categories: UTAH, SALINITY

Access Code: 002 Use Code: 02

The Price River is a significant contributor of salt to the Colorado River. Relatively pristine waters leaving the upper elevations of the basin degenerate into highly saline waters entering the Green River. This paper presented the structure of an evolving model of the salt pick-up and transport processes in the Price River Basin. The initial purpose of the model was to aid in the identification of the natural and man-modified hydro-salinity-sediment system of the basin, based on data collection and analysis in the field and the laboratory. This identification procedure will result in both a better qualitative understanding of the important physio-chemical processes and a mathematical discription of these processes. When the identification stage is complete, the model will be used as a management tool for such purposes as examining various strategies for reducing salt loads in the Price River and in other similar rivers.

ABSTRACT

Accession Number:
@ 665.3
Riley, J.P., Bowles, D.S., Chadwick, D.G., and Grenney, W.J.,
Feb. 1977, Preliminary identification of the salt pick-up and transport process in the Price River basin, Utah: paper presented at the Third International Hydrology Symposium, Fort Collins, Colorado, OWRT-A-039-Utah (1), 15 p.

Contact: J.P. Riley (copy)

Key Categories: UTAH, SALINITY

Access Code: 002 Use Code: 02

The structure of an evolving model of the salt pick-up and transport processes in the Price River Basin is presented. The initial purpose of the model is to aid in the identification of the natural and man-modified hydro-salinity-sediment system of the basin. This identification procedure will result in both a better qualitative understanding of the important physiochemical processes, and in a mathematically precise description of these processes. When the identification stage is complete, the model will be used as a management tool for such purposes as examining various strategies for reducing salt loads in the Price River and in other similar rivers.

ABSTRACT

Accession Number:
@ 666
Riley, R.G., and others, 1982, Alkenes as potential indicators of
sediment shale oil contamination submitted to Environmental Science
and Technology, May 1982

Contact: Ray Wildung (copy)

Key Categories: ENVIRONMENTAL, SURFACE WATER QUALITY, SURFACE,
COLORADO

Access Code: 011 Use Code: 01

Hydrocarbon fractions isolated from four shale oils, two petroleum oils, and one solvent refined coal liquid product were analyzed by capillary gas chromatography/mass spectrometry for the presence of a homologous series of 1-alkenes. Of the liquid oil products examined, only the shale oils contained the 1-alkenes. 1-Alkenes were not detected in the hydrocarbon fractions of extracts from a raw oil shale or surface sediments collected in a drainage at locations above, adjacent to, and below the Department of Energy Anvil Points Oil Shale Facility, Rifle, Colorado. However, 1-alkenes were detected in retorted shale, sediment aggregates formed after oil transport downstream of the facility, and oil discharging from a shale pile. The absence of 1-alkenes in petroleum and a coal liquid product suggests that this class of compounds may be unique to shale oils, perhaps allowing their use as diagnostic indicators of sediments in contact with shale oils or their refined products.

ABSTRACT

Accession Number:
@ 667
Riley, R.G., Garland, T.R., Shiosaki, K., Mann, D.C., and Wildung, R.E., 1981, Alkylpyridines in surface waters, groundwater, and subsoils of a drainage located adjacent to an oil shale facility: in Environmental Science and Technology, v. 15. no. 6, p. 697-701.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, GROUNDWATER QUALITY, ENVIRONMENTAL, SURFACE, LEACHING

Access Code: 011 Use Code: 01

Soil extracts, surface waters, and groundwaters were analyzed for the presence of water-soluble organic compounds in a drainage located adjacent to the retorted shale disposal pile at the Department of Energy Anvil Points Oil Shale Facility, Rifle, CO. The C_3–C_6 alkylpyridines were positively identified in water from one of several alluvial wells, and in a surface seep. Surface waters of the stream below the seep contained alkylpyridines but in lower concentration. Alkylpyridines were detected in a moist subsoil sampled adjacent to the well, in retort water, and in aqueous extracts of shale oil. They were not detected in aqueous extracts of raw shale, retorted shale, or Prudhoe Bay crude oil. The absence of the alkylpyridines in a petroleum suggests that the compounds may be unique to shale oils, perhaps allowing their use as diagnostic indicators of water in contact with shale oils at sites of oil shale production and processing.

ABSTRACT

Accession Number:
@ 668
Riley, R.G., Shiosake, K., Bean, R.M., and Schoengold, D.M., 1979, Solvent solubilization, characterization, and quantitation of aliphatic carboxylic acids in oil shale retort water following chemical derivatization with boron trifluoride in methanol: Analytical Chemistry, v. 51, no. 12, p. 1995-1998.

Contact: Denver Public Library (loan)

Key Categories: EFFLUENT, SURFACE

Access Code: 002 Use Code: 02

Treatment of a sample of freeze-dried retort water from the Paraho Oil Shale Demonstration Project (Rifle, Colo.) with BFD_3/MeOH converted 28% of the organic carbon in the sample to a benzene soluble form. Capillary gas chromatographic/mass spectometric analysis of the benzene extract revealed the presence of homologous series of aliphatic monocarboxylic and dicarboxylic acids at concentrations ranging from 3.2 to 138.4 ppM, based on original retort water. These results suggest that this technique in combination with other derivatization techniques can be used to characterize and quantitate water soluble classes of organic components of aqueous process wastes and other environmental samples.

ABSTRACT

Accession Number:
@ 669
Rinaldi, G.M., Delaney, J.L., and Hedley, W.H., Feb. 1980,
Environmental characterization of Geokinetics' in situ oil shale retorting technology: Rep. EPA-600/7-81-021, 81 p.

Contact: NTIS (copy)

Key Categories: IN-SITU, EFFLUENTS, ENVIRONMENTAL

Access Code: 011 Use Code: 02

Air emissions and water effluents from true in situ oil shale retorting were physically chemcially and biologically characterized by sampling of Geokinetics Retort No. 17, a pilot-scale unit which produced 30 barrels of crude shale oil per day during testing from July 16 to July 26, 1979. The potential pollution sources tested were the retort off-gases before and after mist elimination, exhaust from thermal incineration of the demister outlet gases, fugitive gas seepage through the retort surface and around well castings, retort water after oil separation, and evaporation pond water. The three stack gas streams were analyzed for ammonia, arsine, carbon monoxide, hydrocarbons, hydrogen cyanide, oxides of nitrogen and sulfur, particulate matter and trace elements. Hydrocarbons and carbon monoxide were quantified in the fugitive emissions samples. Water quality parameters, organic priority pollutants, and trace elements were measured in the two water samples. Selected air and water pollution samples were tested for biological activity, using the Ames mutagenicity assay, the Chinese hamster ovary (CHO) clonal toxicity assay, and the rabbit alveolar macrophage (RAM) cytotoxicity assay.

ABSTRACT

Accession Number:
@ 670
Ringen, B.H., 1982, Relation of suspended sediment to streamflow in the Green River basin, Wyoming, U.S. Geological Survey Water-Resources Investigation, [in review, Jan. 1982].

Contact: Hugh Lawham (status)

Key Categories: WYOMING, SEDIMENT, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 01

This report presents and discusses sediment rating curves for about 30 streamflow stations in the Green River Basin, Wyoming. The majority of the data is for the period 1974-1981.

ABSTRACT

Accession Number:
@ 671
Ringen, B.H., 1974, Ground-water levels in Wyoming, 1972-73: Wyoming State Engineer's Office, Cheyenne, Wyoming, Wyoming Water Planning Program Report No. 13, Supplement No. 1, 158 p.

Contact: BLM - Cheyenne (loan)

Key Categories: WYOMING, GROUNDWATER QUANTITY

Access Code: 152 Use Code: 02

This report is the second in a series listing groung-water levels in the State of Wyoming. The first report (Ringen, 1973) contains records of water levels in the State from 1940 to 1971.

Generally, water-level measurements listed in this report are for wells with a sufficient number of measurements to show a trend in fluctuations. Short-term records, generally less than 5 measurements, are not included; however, all water-level measurements are available for inspection in the District office of the U.S. Geological Survey in Cheyenne, Wyoming.

Water-level measurements given in this report were made by the U.S. Geological Survey in cooperation with the city of Cheyenne, the National Park Service, the Wyoming Department of Economic Planning and Development, and the Wyoming State Engineer.

ABSTRACT

Accession Number:
@ 672
Ringen, B.H., 1973, Records of ground-water levels in Wyoming, 1940-1971: Wyoming State Engineer's Office, Cheyenne, Wyoming, Wyoming Water Planning Program Report No. 13, 479 p.

Contact: BLM - Cheyenne (loan)

Key Categories: WYOMING, GROUNDWATER QUANTITY

Access Code: 152 Use Code: 02

The purpose of this report is to publish, in a single volume, ground-water-level measurements (published and unpublished) that have been made in Wyoming in the period 1940-71 by the U.S. Geological Survey. Water-level measurements by other agencies in several of the same wells measured by the U.S. Geological Survey have been included, where available, to provide greater detail in a record, or to increase the length of a record. Generally, water-level measurements in this report are for wells with a sufficient number of measurements to show a trend of fluctuations. Single water-level measurements in wells or short-term records of three or four measurements are not included in this report; however, these data are available for consultation in the District office of the U.S. Geological Survey in Cheyenne, Wyoming.

ABSTRACT

Accession Number:
@ 673
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), 1981, Modular development phase monitoring report 8, Dec. 1980 - May 1981, mid-year report, Vols. 1-2: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, CLIMATE, SPRINGS, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SUBSIDENCE, IN-SITU

Access Code: 011 Use Code: 01

This is a progress report under the modular development phase environmental monitoring program at tract C-a. The purpose of this program, described in Abstract No. 706, is to record changes from baseline and to evaluate environmental compliance during tract development. These volumes describe and interpret environmental conditions and present detailed environmental data from atmospheric, terrestrial, aquatic, hydrology, and other studies. The first volume in each series contains a summary and interpretation of the data and other volumes tabulate and present the detailed data. The data are reported semi-annually, in the mid-year and year-end report.

This is the eighth monitoring report and the fourth mid-year data report under this program. It presents the data collected for the six month period, summarizes the winter and spring data, compares it with previous data and notes impacts which may have been caused by initial development activities.

ABSTRACT

Accession Number:
@ 674
Rio Blanco Oil Shale Company, 1981, Modular development phase monitoring report 8, Dec. 1980 - May 1981: mid-year report, v. 2 of 2, plus appendices, U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, CLIMATE, SPRINGS, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SEDIMENT

Access Code: 000 Use Code: 01

ABSTRACT

Accession Number:
@ 675
Rio Blanco Oil Shale Company, March 1981, Modular development phase monitoring report 7, Dec. 1979 - Nov. 1980: v. 1 of 4, year end report, U.S. Dept. of Interior, prototype oil shale leasing program, 513 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SPRINGS, CLIMATE, SEDIMENT, SUBSIDENCE, RECLAMATION, IN-SITU, LEACHING, COLORADO

Access Code: 011 Use Code: 01

The Modular Development Phase (MDP) monitoring program provides environmental data during the modular development of the modified in-situ retorting process at lease tract C-a. This program was initiated in August 1977 and monitoring reports have been published semiannually since then. This report is the seventh in the series and it covers the period from December 1979 through November 1980. Volume 1 summarizes the data collected during the period, present statistical comparison between season, years, and locations, and assesses any impacts caused by development activities. It also overviews the on-tract subsidence monitoring program and presents preliminary analyses of raw shale leachates produced in an on-tract lysimeter operated by Colorado State University. Volume 3 of this report, presents air quality and meteorological data for tract C-a including precipitation, snow depth, barometric pressure, and visibility data. Volume 4 presents quality and quantity data for several surface water stations, alluvial, upper and lower aquifer wells, and springs, and it summarizes the results of revegetation studies.

ABSTRACT

Accession Number:
@ 676
Rio Blanco Oil Shale Company, March 1981, Modular development phase monitoring report 7, Dec. 1979 - Nov. 1980: v. 2 of 4, year end report, U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: CLIMATE, COLORADO

Access Code: 002 Use Code: 01

The Modular Development Phase (MDP) monitoring program provides environmental data during the modular development of the modified in-situ retorting process at lease tract C-a. This program was initiated in August 1977 and monitoring reports have been published semiannually since then. This report is the seventh in the series and it covers the period from December 1979 through November 1980. Volume I summarizes the data collected during the period, present statistical comparison between season, years, and locations, and assesses any impacts caused by development activities. It also overviews the on-tract subsidence monitoring program and presents preliminary analyses of raw shale leachates produced in an on-tract lysimeter operated by Colorado State University. Volume 3 of this report, presents air quality and meteorological data for tract C-a including precipitation, snow depth, barometric pressure, and visibility data. Volume 4 presents quality and quantity data for several surface water stations, alluvial, upper and lower aquifer wells, and springs, and it summarizes the results of revegetation studies.

ABSTRACT

Accession Number:
@ 677
Rio Blanco Oil Shale Company, March 1981, Modular development phase monitoring report 7, Dec. 1979 - Nov. 1980: v. 4 of 4, year end report, U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SPRINGS, SEDIMENT, RECLAMATION, IN-SITU, COLORADO

Access Code: 002 Use Code: 01

The Modular Development Phase (MDP) monitoring program provides environmental data during the modular development of the modified in-situ retorting process at lease tract C-a. This program was initiated in August 1977 and monitoring reports have been published semiannually since then. This report is the seventh in the series and it covers the period from December 1979 through November 1980. Volume I summarizes the data collected during the period, present statistical comparison between season, years, and locations, and assesses any impacts caused by development activities. It also overviews the on-tract subsidence monitoring program and presents preliminary analyses of raw shale leachates produced in an on-tract lysimeter operated by Colorado State University. Volume 3 of this report, presents air quality and meteorological data for tract C-a including precipitation, snow depth, barometric pressure, and visibility data. Volume 4 presents quality and quantity data for several surface water stations, alluvial, upper and lower aquifer wells, and springs, and it summarizes the results of revegetation studies.

ABSTRACT

Accession Number:
@ 678
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), 1980, Modular development phase, monitoring report 6, Dec. 1979-May 1980; mid-year report v. 1-2: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SPRINGS, CLIMATE, SEDIMENT

Access Code: 002 Use Code: 01

This is a progress report under the modular development phase environmental monitoring program at tract C-a. The purpose of this program, described in Abstract No. 706, is to record changes from baseline and to evaluate environmental compliance during tract development. These volumes describe and interpret environmental conditions and present detailed environmental data from atmospheric, terrestrial, aquatic, hydrology, and other studies. The first volume in each series contains a summary and interpretation of the data and other volumes tabulate and present the detailed data. The data are reported semi-annually, in the mid-year and year-end report.

This is the sixth monitoring report and the third mid-year data report under this program. It presents the data collected for the six-month period, summarizes winter and spring data and compares it with previous data, and notes impacts which may have been caused by initial development.

ABSTRACT

Accession Number:
@ 679
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), 1980, Modular development phase, monitoring report 5, Dec. 1978 - Nov. 1979: year-end report, v. 1: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, CLIMATE, SPRINGS, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SUBSIDENCE, IN-SITU

Access Code: 011 Use Code: 02

This is a progress report under the modular development phase environmental monitoring program at tract C-a. The purpose of this program, described in Abstract No. 706, is to record changes from baseline and to evaluate environmental compliance during tract development. These volumes describe and interpret environmental conditions and present detailed environmental data from atmospheric, terrestrial, aquatic, hydrology, and other studies. The first volume in each series contains a summary and interpretation of the data and other volumes tabulate and present the detailed data. The data are reported semi-annually, in the mid-year and year-end report.

This is the fifth monitoring report and the third interpretative year-end report under this program. It presents the data collected for the six-month period, and summarizes data collected for the 1979 reporting year; presents statistical comparisons between seasons, years, and locations, and assesses impacts which may have been caused by development activities.

ABSTRACT

Accession Number:
@ 682
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), 1979, Modular development phase monitoring report 4, Dec. 1978 - May 1979, mid-year report, v. 1-2, U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SPRINGS, CLIMATE, SEDIMENT

Access Code: 002 Use Code: 02

This is a progress report under the modular development phase environmental monitoring program at tract C-a. The purpose of this program, described in Abstract No. 706, is to record changes from baseline and to evaluate environmental compliance during tract development. These volumes describe and interpret environmental conditions and present detailed environmental data from atmospheric, terrestrial, aquatic, hydrology, and other studies. The first volume in each series contains a summary and interpretation of the data and other volumes tabulate and present the detailed data. The data are reported semi-annually, in the mid-year and year-end report.

This is the fourth monitoring report, and the second mid-year report. It presents the data collected for the six-month period, summarizes winter and spring data and compares it with previous data, and notes impacts which may have been caused by initial development.

ABSTRACT

Accession Number:
@ 686
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), 1978, Modular development phase monitoring report 2, Dec. 1977 - May 1978, Mid-year report, vols. 1-2: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SPRINGS, CLIMATE, SEDIMENT

Access Code: 002 Use Code: 02

This is a progress report under the modular development phase environmental monitoring program at tract C-a. The purpose of this program, described in Abstract No. 706, is to record changes from baseline and to evaluate environmental compliance during tract development. These volumes describe and interpret environmental conditions and present detailed environmental data from atmospheric, terrestrial, aquatic, hydrology, and other studies. The first volume in each series contains a summary and interpretation of the data and other volumes tabulate and present the detailed data. The data are reported semi-annually, in the mid-year and year-end report.

This is the second monitoring report and the first mid-year data report under this program. It presents the data collected for the six-month period, compares it with baseline and interim data.

ABSTRACT

Accession Number:
@ 687
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), 1978, Modular development phase monitoring report 1, Sept. 1977 - Nov. 1977: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SPRINGS, CLIMATE, SEDIMENT

Access Code: 002 Use Code: 02

This is a progress report under the modular development phase environmental monitoring program at tract C-a. The purpose of this program, described in Abstract No. 706, is to record changes from baseline and to evaluate environmental compliance during tract development. These volumes describe and interpret environmental conditions and present detailed environmental data from atmospheric, terrestrial, aquatic, hydrology, and other studies. The first volume in each series contains a summary and interpretation of the data and other volumes tabulate and present the detailed data. The data are reported semi-annually, in the mid-year and year-end report.

This is the first monitoring report under this program. It presents and summarizes the data collected during 1977 and compares it with baseline and interim data.

ABSTRACT

Accession Number:
@ 688
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), April 1981, Tract C-a, annual progress report, Jan. 1980 - Dec. 1980: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, ENVIRONMENTAL

access Code: 011 Use Code: 03

This third annual progress report describes the operational and monitoring programs performed by the Rio Blanco Oil Shale Company on tract C-a from January 1, 1980 through December 31, 1980. The report includes sections on mining, processing (retort zero), ore storage, environmental protection, health and safety, and environmental assessment and monitoring.

ABSTRACT

Accession Number:
@ 688.1
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co.), 1980, Tract C-a annual progress report, Jan. 1979 - Dec. 1979: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This second annual progress report describes the operational and monitoring programs performed by the Rio Blanco Oil Shale Company on tract C-a from January 1, 1979 through December 31, 1979. The report includes sections on mining, processing, ore disposal, support facilities (including water management), environmental protection, health and safety, and environmental assessment and monitoring.

ABSTRACT

Accession Number:
@ 689
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co.), March 1979, Tract C-a annual progress report, Sept. 1977 - Dec. 1978: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 690
Rio Blanco Oil Shale Company (Gulf Oil Corp.and Standard Oil Co. (Indiana)), . Oct. 1977, Second semi-annual report, interim environmental studies: U.S. Dept. of Interior, prototype oil shale leasing program, 143 p. plus appendices.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, CLIMATE, SURFACE WATER QUALITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 02

In September 1976, the Rio Blanco Oil Shale Project (RBOSP) was granted a one-year suspension from activities on tract C-a. During that period, RBOSP conducted interim environmental studies for the purposes of: (1) obtaining additional baseline data for selected parameters; (2) further exploring problem areas and (3) maintaining the continuity of baseline and monitoring data. To achieve these goals, limited air quality, meteorology, terrestrial, aquatic, and hydrology data were collected.

Results of the first six months of data collection were reported in the first Interim Studies Semi Annual Report. Results of the second six-month period (March through August 1977), and comparisons of interim and baseline data, are presented in this report.

ABSTRACT

Accession Number:
@ 691
Rio Blanco Oil Shale Company (Gulf Oil Corp., Standard Oil Co. (Indiana)), March 1977, Semi-annual report 1977 - interim studies: U.S. Dept. of Interior, prototype oil shale leasing program, 67 p., plus Appendix A.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, CLIMATE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY,

Access Code: 011 Use Code: 03

The federal lease on tract C-a was suspended from September 1, 1976 through September 1, 1977. During this suspension period, interim environmental studies were conducted to maintain continuity of data gatering on critical parameters. The purpose of the interim environmental study was to further explore identified problem areas, to provide the Government and the Lesee with further knowledge of environmental conditions on the lease tract and to permit rapid commencement of operations at the end of the suspension period.

This report describes the interim environmental studies conducted since the onset of suspension and presents data collected during the first six months of the program. Objectives and methods for each discipline are described. However, most data presentations will be made in the second semi-annual interim studies report, since only limited field studies were conducted.

The interim environmental studies are divided into several technical disciplines and include: atmospheris studies, hydrology, aquatic biology and terrestrial biology. Hydrological studies included finalization of 85 Mesa studies and continued monitoring at selected USGS stations and monitoring holes. Precipitation chemistry was added to the program. Aquatic biology was studied at three stations. Terrestrial biology studies include mule deer, small mammals, range and browse, breeding birds and sandhill cranes.

ABSTRACT

Accession Number:
@ 691.1
Rio Blanco Oil Shale Company (Gulf Oil Corporation and Standard Oil Company (Indiana)), 1977, Progress report No. 10 on Tract C-a oil shale development, March - May 1976, summary: , U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE

Access Code: 002 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies incude plant ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the tenth summary report for tract C-a filed under the baseline program, and it covers the period December 1976 through February 1977. The report includes sections on geology, hydrology, air quality, meterology, terrestrial and aquatic biota, and other environmental studies.

ABSTRACT

Accession Number:
@ 691.2
Rio Blanco Oil Shale Company (Gulf Oil Corporation and Standard Oil Company (Indiana)), 1976, Progress report No. 9 on Tract C-a oil shale development, March - May 1976, summary: , U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE

Access Code: 002 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the ninth summary report for tract C-a filed under the baseline program, and it covers the period September 1976 through November 1976. The report includes sections on geology, hydrology, air quality, meteorology, terrestrial and aquatic biota, and other environmental programs.

ABSTRACT

Accession Number:
@ 691.3
Rio Blanco Oil Shale Company (Gulf Oil Corporation and Standard Oil Company (Indiana)), 1976, Progress report No. 8 on Tract C-a oil shale development, March - May 1976, summary: , U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE

Access Code: 002 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the eighth summary report for tract C-a filed under the baseline program, and it covers the period June 1976 through August 1976. The report includes sections on geology, hydrology, air quality, meteorology, terrestrial and aquatic biota, and other environmental programs.

ABSTRACT

Accession Number:
@ 692
Rio Blanco Oil Shale Company (Gulf Oil Corporation and Standard Oil Co. (Indiana)), July 1976, Progress report No. 7 - summary, Tract C-a oil shale development, March - May 1976, : , U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the seventh summary report for tract C-a filed under the baseline program, and it covers the period March 1976 through May 1976. The report includes sections on geology, hydrology, air quality, meteorology, terrestrial and aquatic biota, soils, revegetation, and archaeology.

ABSTRACT

Accession Number:
@ 692.1
Rio Blanco Oil Shale Company (Gulf Oil Corporation and Standard Oil Company (Indiana)), 1976, Progress report No. 6 on Tract C-a oil shale development, March - May 1976, summary: , U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the sixth summary report for tract C-a filed under the baseline program, and it covers the period December 1975 through February 1976. The report includes sections on geology, hydrology, air quality, meteorology, terrestrial and aquatic biota, and other environmental programs.

ABSTRACT

Accession Number:
@ 693
Rio Blanco Oil Shale Company (Gulf Oil Corporation and Standard Oil Co. (Indiana)), Nov. 1975, Progress report No. 5 on Tract C-a oil shale development: , U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the fifth summary report for tract C-a filed under the baseline program, and it covers the period September 1975 through November 1975. The report includes sections on geology, hydrology, air quality, meteorology, terrestrial and aquatic biota, soils, archaeology, revegetation, toxicology, and seismicity.

ABSTRACT

Accession Number:
@ 694
Rio Blanco Oil Shale Company (Gulf Oil Corporation and Standard Oil Company (Indiana)), Oct. 1975, Progress report No. 4 to USGS on Tract C-a oil shale development: , U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the fourth summary report for tract C-a filed under the baseline program, and it covers the period June 1975 through August 1975. The report includes sections on geology, hydrology, air quality, meteorology, terrestrial and aquatic biota, soils, archaeology, revegetation, toxicology, and seismicity. Appendices address engineering studies, offsite facilities, and water acquisition.

ABSTRACT

Accession Number:
@ 694.1
Rio Blanco Oil Shale Company (Gulf Oil Corporation and Standard Oil Company (Indiana)), 1975, Progress report No. 3 to USGS on Tract C-a oil shale development: , U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the third summary report for tract C-a filed under the baseline program, and it covers the period March 1975 through May 1975. The report includes sections on geology, hydrology, air quality, meteorology, terrestrial and aquatic biota, and other environmental studies. Appendices address engineering studies, mining considerations, processing methods, and offsite developments (surface water acquisition, grundwater system, etc.).

ABSTRACT

Accession Number:
@ 694.2
Rio Blanco Oil Shale Company (Gulf Oil Corporation and Standard Oil Company (Indiana)), Feb. 1975, Progress report No. 2 to USGS on Tract C-a oil shale development: , U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, CLIMATE, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY,

Access Code: 011 Use Code: 03

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the second summary report for tract C-a filed under the baseline program, and it covers the period October 1974 through February 1975. The report includes major sections on geology, hydrology, air quality, meteorology, terrestrial and aquatic biota, and other environmental studies. Appendices discuss mining, crusting, retorting, and other aspects of facility development.

ABSTRACT

Accession Number:
@ 695
Rio Blanco Oil Shale Company (Gulf Oil Corporation and Standard Oil Company (Indiana)), Feb. 1975, Progress report No. 1 to USGS on Tract C-a oil shale development: , U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY,

Access Code: 011 Use Code: 03

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the first summary report for tract C-a filed under the baseline program, and it covers the period March 1974 through September 1974. The focus of activities during this period was organization and geotechnical data gathering; thus, very little environmental baseline and monitoring data are included. The appendix presents USGS water quality data for stations on tract C-a and well completion reports for 8 coreholes.

ABSTRACT

Accession Number:
@ 696
Rio Blanco Oil Shale Company, (Gulf Oil Corp. and Standard Oil Co. (Indiana)), Sept. 1977, Oil Shale Tract C-a, supplemental material to revised detailed development plan: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: PROCESS WATER USE, ENVIRONMENTAL, IN-SITU, COLORADO

Access Code: 011 Use Code: 01

This report presents Rio Blanco Oil Shale Project's response to review comments from the Area Oil Shale Supervisor's Office on the Revised detailed development plan. The report tabulates additional data, presents various flow diagrams and figures on the process, and discusses specific points raised during the review. The following material is included: errata sheets; description of revised method for sinking shafts; revised retort geometry; and supplemental information on sulfur balances, processed shale disposal, transportation, air quality control, water quality control, and water balances. Some of the more relevant data and information in this report include schematics of the sequence of development of spent shale piles, sulfur flow diagrams, tabulations of emissions of SO_2, NO_x, particulates, hydrocarbons, and CO by source, tabular comparisons of air quality modeling results with standards, and process water flow diagrams.

ABSTRACT

Accession Number:
@ 697
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), May 1977, Revised detailed development plan, Tract C-a: Vol 1 - introduction and executive summary, U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, PROCESS WATER USE, ENVIRONMENTAL, IN-SITU

Access Code: 011 Use Code: 02

This is Volume 1 of the three-volume, revised detailed development plan for tract C-a. This revision changes the development plans for tract C-a to the modified in situ process with on-tract surface retorting of mined shale (to create in situ void volume), on-tract disposal of spent shale and wastes, and on-tract support facilities.

Volume I of this revised DDP describes the project background, discussing the prototype leasing program, specific lease provisions, lease history, and the proposed development plans. This is followed by an executive summary which overviews the material contained in the other two volumes. It discusses mining, processing, spent shale disposal, support facilities, environmental plans and assessment and monitoring.

ABSTRACT

Accession Number:
@ 698
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), May 1977, Revised detailed development plan, Tract C-a: Vol 2 - mining, processing and support facilities, U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, PROCESS WATER USE, EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 01

This is volume 2 of the three-volume revised detailed development plan for tract C-a. The proposed facility consists of the modified in situ process with on-tract surface retorting of mined shale, on-tract disposal of spent shale and other wastes, and on-tract support facilities. This volume describes engineering plans for developing this tract, and it includes sections on mining, processing, spent shale disposal, and support facilities. The latter section addresses water management.

ABSTRACT

Accession Number:
@ 699
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), May 1977, Revised detailed development plan, Tract C-a: Vol 3 - environmental protection and monitoring, U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, ENVIRONMENTAL, EFFLUENTS, RECLAMATION, SEDIMENT, SURFACE, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, IN-SITU, SUBSIDENCE

Access Code: 011 Use Code: 01

This is Volume 3 of the three-volume revised detailed development plan for tract C-a. The proposed facility consists of the modified in situ process with on-tract support facilities. This volume describes the environmental protection plans and includes sections on environmental assessment and monitoring.

Environmental protection plans are presented for health and safety, fire prevention and control, noise, air quality and water quality control, land rehabilitation and erosion control, solid waste control, and others. Potential impacts of the proposed development on terrestrial biota on aquatic biota, on cultural resources, and on air and water resources are discussed, and methods to mitigate them are presented. Finally, a monitoring program is described to identify environmental impacts associated with the proposed development.

ABSTRACT

Accession Number:
@ 700
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), March 1976, Detailed development plan, Tract C-a: Vol 1 - project background and executive summary, U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 02

This is Volume 1 of the original four-volume Detailed Development Plan (DDP) for lease tract C-a submitted under the Federal Prototype Oil Shale Leasing Program. The four volumes of this DDP describe the baseline conditions and Rio Blanco Oil Shale Project's (RBOSP) proposed construction and operation of a commercial-scale oil shale complex and support facilities on and around tract C-a. The proposed facility consists of open-pit mining, off-tract surface retorting, and off-tract disposal of spent shale and overburden. The proposed commerical facility consisted of a combination of TOSCO II and gas combustion-type Paraho retorts with a total processing capability of 119,000 tons per stream day. Delayed coking and hydrotreating were proposed to produce upgraded shale oil at the rate of 55,800 barrels per day. Hydrogen and oxygen production, high and low BTU gas production, sulfur and ammonia recovery, and coke production also were proposed.

Volume 1 of this DDP describes the project background, discussing the prototype leasing program, specific lease provisions, and lease history. This is followed by an executive summary which overviews the material contained in the other three volumes. It discusses the proposed project; rationales for major decisions; baseline conditions; environmental assessment; monitoring; and environmental protection, health and safety plans.

ABSTRACT

Accession Number:
@ 701
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), March 1976, Detailed development plan, Tract C-a: Vol 2 - baseline conditions, U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, CLIMATE, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

This is Volume 2 of the original detailed development plan for lease tract C-a. The proposed facility consists of open-pit mining off-tract surface retorting, and off-tract disposal of spent shale and overburden. This volume summarizes the first year's environmental baseline programs and the environmental setting on and around the tract. The proposed commercial facility is described in Abstract No. 700.

Extensive baseline studies at tract C-a, covering surface water, groundwater, flora, fauna, aquatic ecology, soil productivity, air quality, soils, and geology, were started in 1974. The detailed data from these studies are presented in quarterly data reports abstracted elsewhere in this bibliography (Abstract No.). This report reviews and interprets the data collected during the first year of these studies. Data and interpretative sections are included on the following topics: geology, hydrology, air quality, meteorology, terrestrial ecology, aquatic ecology, seismicity, archaeology, paleontology, soils and overburden, trace metals, and ecological interactions.

ABSTRACT

Accession Number:
@ 702
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), March 1976, Detailed development plan, Tract C-a: Vol 3 - mining, processing and support facilities, U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, PROCESS WATER USE, RECLAMATION, EFFLUENTS, SURFACE

Access Code: 011 Use Code: 01

This is Volume 3 of the original detailed development plan for lease tract C-a. The proposed facility consists of open-pit mining, off-tract surface retorting, and off-tract disposal of spent shale and overburden. This volume describes engineering plans for developing tract C-a and includes sections on mining, retort feed preparation, processing, processed shale and overburden disposal and support facilities. Additional information on the proposed commercial facility is contained in Abstract No. 700.

ABSTRACT

Accession Number:
@ 703
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), March 1976, Detailed development plan, Tract C-a: Vol 4 - environmental protection and monitoring, U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, ENVIRONMENTAL, WATER LAW, RECLAMATION, EFFLUENTS, SEDIMENT, SURFACE

Access Code: 011 Use Code: 01

This is Volume 4 of the original detailed development plan for lease tract C-a. The proposed facility consists of open-pit mining, off-tract surface retorting, and off-tract disposal of spent shale and overburden. This volume describes environmental protection plans, environmental assessment, and monitoring for that facility. Additional information on the proposed commercial facility is contained in Abstract No. 700.

Environmental protection plans are presented for health and safety, fire prevention and control, noise control, air quality control, water quality control, oil and hazardous material control, land rehabilitation and erosion control, solid waste control, aesthetics, fish and wildlife management, protection of scientific and historic objects, and for site abandonment. Each of these sections discusses pertinent regulations, and aspects of the proposed development that are of concern, and proposed management or other measures that will be taken to alleviate these concerns. The results of an environmental assessment (air and water) of the proposed development are described, and a revised monitoring program, based on the first year of baseline data, is also described.

ABSTRACT

Accession Number:
@ 704
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), Feb. 1981, Tract C-a, modification to the detailed development plan, Lurgi Demonstration Project: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: PROCESS WATER USE, LEACHING, EFFLUENTS, SURFACE, RECLAMATION, ENVIRONMENTAL, COLORADO

Access Code: 011 Use Code: 01

This report presents a modification to the revised detailed development plan for (Abstract Nos. 697-699) for tract C-a. The revised plan, based on modified in situ retorting, included surface retorting during the Commercial Phase of operations. This report incorporates the demonstration of Lurgi surface retorting in the Modular Development Phase.

This document describes Rio Blanco Oil Shale Company's plans for the Lurgi Demonstration Project. It contains plans for mining, processing and disposing of spent shale and describes the required support facilities and operations. In addition, mitigative and management procedures for air, water, reclamation, and other environmental areas are discussed. An assessment of anticipated impacts and a monitoring program also are presented. The report includes detailed water flow diagrams for the proposed project.

ABSTRACT

Accession Number:
@ 705
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), March 1979, Application to the Colorado Dept. of Health for (1) continuation of a subsurface disposal system and (2) in situ oil shale retorts numbered 1, 3, 3A, 5, and 5A on Federal Oil Shale Lease Tract C-a: including letter from K.L. Berry, U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: LEACHING, IN-SITU, COMPUTER MODEL

Access Code: 011 Use Code: 02

This is Rio Blanco's application for tract C-a for a permit to continue the existing subsurface disposal system and to operate in-situ retorts 1, 3, 3A, 5, and 5A. The document describes the existing and proposed reinjection, dewatering, and monitoring systems, and presents an overview of the project and potential impacts. Available information on leaching is overviewed and Rio Blanco's program is described. Abandonment plans are presented, and a worst-case scenario, consisting of no control technology, is analyzed.

ABSTRACT

Accession Number:
@ 706
Rio Blanco Oil Shale Company (Gulf Oil Corp. and Standard Oil Co. (Indiana)), Jan. 1979, Scope of work, modular development phase environmental monitoring program, Tract C-a oil shale lease: Gulf Oil Corp. and Standard Oil Co., U.S. Dept. of Interior, prototype oil shale leasing program, 179 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 02

This scope of work describes the tasks that are being conducted to fulfill RBOSC's obligations to monitor selected environmental parameters during in situ development of oil shale resources on Tract C-a. The work scope described herein specifically covers the three-year period January 1978 through December 1981. The monitoring program addresses the period during which ROBSCO will be constructing MDP retorts and associated support facilities, through the ignition and burn of five in situ (MDP) retorts. The purpose of the program is to record changes from baseline and to evaluate compliance with lease provisions and various federal and state regulations.

The program addresses the following areas: air quality, meteorology, terrestrial and aquatic biota, hydrology, and ecological interrelationships.

ABSTRACT

Accession Number:
@ 707
Rio Blanco Oil Shale Company (Gulf Oil Corp., Standard Oil Co. (Indiana)), May 1977, Final environmental baseline report for Tract C-a and vicinity: Book 1 of 2, U.S. Dept. of Interior, prototype oil shale leasing program,.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: COLORADO, CLIMATE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SPRINGS, SEDIMENT

Access Code: 011 Use Code: 01

This is the Final Environmental Baseline Report for tract C-a. This report summarizes environmental data collected on and near this tract from March 1974 through September 1977. The detailed data collected under this program is on file in the Area Oil Shale Supervisor's Office in Grand Junction, Colorado, and was discussed in ten summary reports (Abstract Nos. 692-695) and in interim monitoring reports (Abstract Nos. 690, 691).

This report presents a description of the environment and wildlife on and near tract C-a prior to oil shale development. The report is contained in two volumes and consists of six sections as follows: I-climate and air quality; II-aquatic resources; III-terrestrial ecology; IV-physical and biological interactions; V-cultural resources; and VI-revegetation. Each section contains several chapters which present the baseline results by discipline area. This report contains sections I and II.

ABSTRACT

Accession Number:
@ 708
Rio Blanco Oil Shale Company (Gulf Oil Corp., Standard Oil Co. (Indiana)), May 1977, Final environmental baseline report for Tract C-a and vicinity: Book 2 of 2, U.S. Dept. of Interior, prototype oil shale leasing program,.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: SURFACE, RECLAMATION

Access Code: 011 Use Code: 02

This is the Final Environmental Baseline Report for tract C-a. This report summarizes environmental data collected on and near this tract from March 2974 through September 1977. The detailed data collected under this program is on file in the Area Oil Shale Supervisor's Office in Grand Juntion, Colorado, and was discussed in ten summary reports and in interim monitoring reports.

This report presents a description of the environmental and wildlife on and near tract C-a prior to oil shale development. The report is contained in two volumes and consists of six sections as follows: Volume I - climate and air quality; Volume II - aquatic resources; Volume III - terrestrial ecology; Volume IV - physical and biological interactions; Volume V - cultural resources; and Volume VI - revegetation.

ABSTRACT

Accession Number:
@ 709
Robson, S.G., and Saulnier, G.J. Jr., 1981, Hydrogeochemistry and simulated solute transport, Piceance Basin, Northwestern Colorado: U.S. Geological Survey Professional Paper 1196, 89 p.

Contact: Public Inquiries Office (copy)

Key Categories: COMPUTER MODELS, COLORADO, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

The purpose of this study was to investigate the hydrogeochemistry of the aquifers in the Piceance basin and to evaluate the potential effects of mining activities on the chemical quality of the water resources of the basin.

To meet this objective, the extent, depth, thickness, and hydrologic characteristics of the aquifers in the Piceance basin were estimated. In addition, areal variations in dissolved-solids concentrations and the occurrence and distribution of major ions and trace constituents were described. Mineral reactions, such as dissolution of the saline minerals nahcolite ($NaCO_3$) and halite ($NaCl$), and precipitation of other minerals were studied, as were variations in oxidation and reduction conditions and ion-exchange reactions in the aquifers. Some of these data were used to develop and calibrate a three-dimensional mathematical model that is capable of simulating the spatial and temporal changes in potentiometric heads and dissolved-solids concentrations in five layers representing different depth intervals in the aquifers. By modeling ground-water movement and quality, it is possible to estimate the changes in the ground- and surface-water quality in the basin that may result from mine dewatering or leaching of spent shale in an abandoned and flooded mine.

ABSTRACT

Accession Number:
@ 710
Rocky Mountain Forest and Range Experiment Station, Nov. 1979,
Managing vegetation to increase flow in the Colorado River basin:
General Technical Report RM-66.

Contact: BLM - Craig (loan)

Key Categories: COLORADO, UTAH, WYOMING, SURFACE WATER QUANTITY

Access Code: 102 Use Code: 03

Growing demands and use of water in the Colorado River Basin could result in a widespread water shortage as early as 1995. Local shortages exist already. One method of augmenting the water supply is management of forest and brush lands to increase streamflow.

Theoretically, the surface water supply in the Colorado River Basin could be increased by as much as one-third (6 million acre-feet annually) if vegetation and snow on 16% (26 million acres) of the basin were manipulated solely to increase water yield. However, other forest resources, economics, and social and environmental concerns must also be considered, which tend to greatly reduce both treatment area and effectiveness.

No attempt was made in this report to specify the amount of additional water that could be produced by management of vegetation and snow, except to show how arbitrary amounts might be generated by applying hypothetical treatments to selected portions of the Upper and Lower Basins. The examples chosen were not meant to suggest an attainable level of water yield increase but rather to show the kinds of treatments and how much area might be affected, given an augmentation goal.

ABSTRACT

Accession Number:
@ 711
Rocky Mountain Forest and Range Experiment Station, March 1975,
Hydrologic relations on undisturbed and converted Big Sagebrush lands - the status of our knowledge: USDA Forest Service Research Paper RM-140.

Contact: BLM - Craig (loan)

Key Categories: SURFACE WATER QUANTITY, COLORADO, WYOMING, UTAH

Access Code: 102 Use Code: 03

In this research paper, the hydrologic features of big sagebrush are examined, including relationship to precipitation, wind and drifting snow, and water-yield characteristics of lands of this vegetation type. Also summarized is the response of big sagebrush lands to management practices, such as ground-cover, vegetative and soil-moisture response, snow accumulation, sediment transport and stream-flow regime. Water-yield improvement in the sagebrush type is also discussed.

ABSTRACT

Accession Number:
@ 712
Rocky Mountain Oil and Gas Association, March 1975, Summary of industry oil shale environmental studies and selected bibliography of oil shale environmental references: Denver, Colorado, Oil Shale Committee, 31 p.

Contact: Rocky Mountain Oil and Gas Association (copy)

Key Categories: BIBLIOGRAPHY

Access Code: 011 Use Code: 02

This report was prepared by a Task Force of the Environmental Subcommittee to summarize environmental work programs currently (1975) being conducted by the oil shale industry and to provide a selected bibliography of major current reference works relating to oil shale environmental study. The report consists of a series of matrices which list environmental elements (air quality and meteorology, surface and groundwater monitoring, biological, revegetation/rehabilitation, geology, supportive studies) and industry participants. The types of projects in each category are briefly described.

ABSTRACT

Accession Number:
@ 712.1
Rogers, J.E., Riley, R.G., Li, S.W., Mann, D.C., and Wildung, R.E., Nov. 1981, Microbiological degradation of organic components in oil shale retort water: Organic Acids, Applied and Environmental Microbiology, 830-837 p.

Contact: none

Key Categories: EFFLUENTS, SURFACE, LEACHING

Access Code: 011 Use Code: 02

This article evaluates the fate of organic components in retort water codisposed with spent shale. Characterization data for benzoic acid and a group of aliphatic acids in Paraho retort water are presented. The microbiological degradation of these organic acids was investigated in liquid cultures innoculated with soil as a source of bateria. This work revealed that these organic acids are readily degraded in the early stages of growth of a mixed population of soil bacteria using retort water as the sole source of carbon and energy. Extrapolation of these results to management of retort water used in dust control and compaction of retorted shale suggests that as a minimum, 30% of the organic components (primarily organic acids) in retort water would be readily degraded under aerobic conditions.

ABSTRACT

Accession Number:
@ 712.2
Rogers, J.E., and Li, S.W., June 1978, Microbiological aspects of the ground disposal of oil shale wastes: Battelle Pacific Northwest Laboratory Rep. PNL-SA-7051, 7 p.

Contact: Ray Wildung (copy)

Key Categories: SURFACE, RECLAMATION

Access Code: 011 Use Code: 03

This article summarizes the results of research to assess the importance of microbial activity within spent shale disposal piles. Samples of spent shale and overburden soil were removed from the Colorado State University lysimeter at Anvil Points for microbiological studies. These studies revealed that both bacteria and fungi can colonize spent shale and that the types of bacteria present change with time. Other studies investigated the effect on microorganisms in the pile of retort water used to prewet the spent shale. These studies revealed that retort water has certain toxic and inhibitory properties which can affect microbial growth.

ABSTRACT

Accession Number:
@ 713
Rogers, M.P., 1974, A bibliography of Bureau of Mines publications dealing with oil shale and shale oil 1917-1974: U.S. Energy Research and Development Administration, Laramie Energy Research Center, Laramie, Wyooming, 44 p.

Contact: NTIS (copy)

Key Categories: BIBLIOGRAPHY

Access Code: 011 Use Code: 03

This bibliography summarizes work performed by the Bureau of Mines' Laramie Energy Research Center in mining and energy research. Bibliographic references are organized by year and within year, alphabetically by the author's last name. The majority of the publications deal with oil shale process development and geology.

ABSTRACT

Accession Number:
@ 714
Rosain, R.M., and Mavis, J.D., 1981, Water reuse in steam generation systems for oil shale plants: in Proceedings of the 14th Oil Shale Symposium, Colorado School of Mines Press, Golden, Colorado, p. 347-356.

Contact: Colorado School of Mines (copy)

Key Categories: EFFLUENTS, IN-SITU, PROCESS WATER USE

Access Code: 011 Use Code: 01

All oil shale plants require certain quantities of low- to medium-pressure steam, either for the retorting process itself, for an upgrading facility, or for miscellaneous plant services. Based on direct experience in the use and treatment of produced waters in the enhanced oil recovery field (steam flooding), a case is made for the judicious use of raw or pretreated oil shale plant wastewaters (mine water, retort water, process condensates) as makeup to steam generator systems. This water reuse option can effectively reduce the requirements for fresh water and, in some cases, provide a means of concentrating wastewater organics and salts in the steam generator blowdown. This lower volume, concentrated waste stream may be more amenable to ultimate treatment or disposal in the overall water management plan. Recommendations on steam generator feedwater quality and treatment are made. Options for blowdown treatment and/or ultimate disposal are also provided. The types of steam generator systems available are described as are data on operating systems in the enhanced oil recovery field. Opportunities for further research and development are explored.

ABSTRACT

Accession Number:
@ 714.1
Roskelly, C.O., and Criddle, W.D., 1952, Consumptive use of water and irrigation requirements of crops in Utah: Utah State Engineer Technical Publication no. 8, 30 p.

Contact: none

Key Categories: UTAH, PRESENT WATER USE

Access Code: 002 Use Code: 02

This report summarizes consumptive use and irrigation water requirements for major crops grown in Utah. It represents the initial phase of establishing a guide for further consumptive use studies in Utah.

ABSTRACT

Accession Number:
@ 714.2
Rothfeld, L.B., 1975, Water and energy requirements for an oil shale industry: in Conference on water requirements for lower Colorado River basin energy needs, May 8-9, 1975, p. 81-105.

Contact: none

Key Categories: COLORADO, PROCESS WATER USE, SURFACE

Access Code: 002 Use Code: 02

The most active area of oil shale development has been the Piceance Basin in Colorado, in which the Colony development operation plant, between Rifle and Grand Junction, is described in terms of the mining and refinery technique and water and energy requirements. Present water use by the current Colony design is about 11,800 acre-feet per year (16.5 CFS) and with a projected ten-fold increase by the mid-1980's, water use would be about 118,000 acre-feet per year (165 CFS). The average flow of the Colorado River at Grand Valley is 3600 cu. ft./second and the requirements of the Colony plant and associated developments amount to less than 0.5% of the average flow of the river at the Colony pump station. The industry itself, directly or indirectly can supply the fuel needed for the power generating stations plus about ten times that quantity of fuel for other purposes.

ABSTRACT

Accession Number:
@ 715
Routson, R.C., and Bean, R.M., 1977, Ground disposal of oil shale wastes - a review with an indexed annotated bibliography: Battelle Pacific Northwest Laboratory Report PNL-2200, UC-91, 173 p.

Contact: Ray Wildung (copy)

Key Categories: EFFLUENTS, LEACHING, RECLAMATION, BIBLIOGRAPHY, SURFACE, IN-SITU

Access Code: 011 Use Code: 02

This review covers the available literature concerning ground-disposed wastes and effluents of a potential oil shale industry. Ground disposal has been proposed for essentially all of the solid and liquid wastes produced. Since an oil shale industry is not actually in operation, the review is anticipatory in nature. The section, Oil Shale Technology, provides essential background for interpreting the literature on potential shale oil wastes and the topics are treated more completely in the section entitled Environmental Aspects of the Potential Disposal of Oil Shale Wastes to Ground. The first section of the annotated bibliography cites literature concerning potential oil shale wastes and the second section cites literature concerning oil shale technology. Each section contains reference arranged historically by year. An index is provided.

ABSTRACT

Accession Number:
@ 716
Routson, R.C., Wildung, R.E., and Bean, R.M., Jan. 1979, A review of the environmental impact of ground disposal of oil shale wastes: Journal of Environmental Quality, no. 1, p. 14-19.

Contact: Ray Wildung (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 02

Waste disposal methods for the major types of extraction processes, the potential environmental impacts of waste disposal to the ground, mitigation of environmental effects, and further research needs of the oil shale industry are considered. Principal waste products of oil shale extraction constitute up to 125% of the original volume, and disposal may, therefore, affect vast land areas. Principal wastes scheduled for ground disposal include the waters produced during retorting and subsequently separated from the shale oil and the spent shales remaining after extraction. Retort waters contain relatively high concentrations of complex, soluble organic components and the spent shales contain potentially leachable salts and organic pyrolytic products. In addition, spent shales have erosion potential when disposed on the surface, and considerable effort is being directed to shale management, emphasizing erosion control and shale as a growth medium, and revegetation methods for establishing salt-and drought-tolerant plant species.

ABSTRACT

Accession Number:
@ 716.1
Rowe, J.W.., and McWhorter, D.B., April 1978, Salt loading in disturbed watershed-field study: Journal of Environmental Engineering Division, ASCE, v. 104, no. EE2, Proceedings Paper 13688, p. 323-338.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, SALINITY

Access Code: 002 Use Code: 02

Salt loading of waters receiving drainage from lands disrupted by mining was estimated from nearly 3 years of field data on a strip-mined watershed in western Colorado. Observed salt loading was separated into approximate contributions from mined land, undisturbed land, groundwater runoff, and overland runoff. The inorganic composition of mine drainage was found to be very similar to that obtained in saturation and 1:1 extracts prepared from the disturbed material. Calcium, magnesium, and sulfate dominated the dissolved solids content of the water. In water years 1974 and 1975, the salt loading from mined land was estimated to be 2.37 tons/acre and 2.13 tons/acre respectively. It was estimated that 56% of the total observed salt loading was attributed to mined lands that comprised 17% of the contributing watershed area.

ABSTRACT

Accession Number:
@ 717
Runnells, D., and Esmaili, E., 1980, Release, transport and fate of potential pollutants: in Trace elements in oil shale: University of Colorado Rep. DOE-10298-2, p. 163-216.

Contact: Bill Chappell (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 02

This progress report summarizes the results of laboratory investigations on surface spent shale leachates. The following topics are covered in this report: (1) composition and time variability of leachates from raw and spent TOSCO and Paraho shales; (2) nature and extent of reactions which occur between leachates and geologic materials; and (3) mineralogy, chemistry, and solubility of capillary salts that develope on the surface of spent shale piles. This report includes tabulations of leachate composition data and graphs of the variation in F, B and Mo as a function of leaching time.

ABSTRACT

Accession Number:
@ 718
Runnells, D.D., Glaze, M., Saether, O., and Stollenwerk, K., 1980, Release, transport and fate of some potential pollutants in waters associated with oil shale: in Trace elements in oil shale, University of Colorado Rep. COO-4017-3, p. 134-190.

Contact: Bill Chappell (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011

Use Code: 02

This report summarizes progress from 1976-1979 on laboratory investigations of spent shale leachates. This report focuses on three specific areas: (1) leachate chemistry generated by passing water through columns of shale with emphasis on the role of aging, cycles of wetting and drying, and chemistry of dissolved sulphur; (2) the interaction of leachates with soils of the oil shale region, with emphasis on B and F; and (3) the source and chemical behavior of F in oil shale. Some of this information has been summarized in other research reports and theses (see Abstract Nos. 764, 765, 722, 723, 421, 764.1).

ABSTRACT

Accession Number:
@ 719
Runnells, D.D., Stollenwerk, K., Saether, O., and Glaze, M., 1978, Release, transport, and fate of some potential pollutants: in Trace elements in oil shale, University of Colorado Rep. COO-4017-2 p. 49-97.

Contact: Bill Chappell (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 02

This progress report summarizes the results of laboratory investigations on: (1) the chemistry of leachate from TOSCO II and Paraho spent shales, with emphasis on F, S, and TDS; (2) the mineralogy, residence, an aqueous mobility of F; and (3) the interaction between soils from the Piceance Creek Basin and leachate that is rich in F and B. Most of this information is summarized in other research reports and theses (see Abstract Nos. 764, 765, 722, 723, 421, 764.1).

ABSTRACT

Accession Number:
@ 720
Russell, P.P., 1979, The effects of oil shale-related effluents on benthic freshwater organisms: Ph.D. Dissertation, University of California, Berkeley, CA, 290 p.

Contact: Gloria Gill - LBL (copy)

Key Categories: EFFLUENTS, ENVIRONMENTAL, IN-SITU, COLORADO

Access Code: 011 Use Code: 02

Laboratory scale model streams were developed to assess the effects of oil shale-related effluents on lotic freshwater aufwuchs and caddisfly larvae. Aufwuchs consists of bacteria, fungi, algae and microscopic invertebrates residing on submerged, solid surfaces. Together with the caddisfly larvae, aufwuchs can indicate biological responses at several trophic levels. A major impact of oil shale development in the headwaters of the Colorado River System may be on aquatic organisms in small streams.

Tygon tubing artificial substrates were designed to monitor colonization and development of aufwuchs over the course of the 9-day experimental runs. Model stream design allowed variation of water temperature, chemical composition, flow rate and illumination intensity and periodicity. Chemical constancy of the stream water was provided by continuously metering new water to the streams with doses of test effluents. Experimental runs tested Omega-9 water (groundwater diluted, in situ retort water) at dilutions between 0.013% and 2.12%; Unfiltered Omega-9 water at dilutions between 0.27% and 1.06%; 150 ton retort water (retort water from an above-ground, in situ simulator) at dilutions between 0.084% and 0.67%; and ammonium carbonate solutions of 0.56 mM to 4.54 mM. The aufwuchs response to the effluents was monitored macroscopically, microscopically, and through measurement of biomass, ATP, chlorophyll a, respiration rate and photosynthetic rate.

Readily measurable effects in the aufwuchs was produced by exposure to Omega-9 water and Unfiltered Omega-9 water at 1% and higher and 150 ton retort water at 0.34% and higher. In general, high effluent concentrations reduced the percentage of diatoms in the aufwuchs population, increased heterotrophy and promoted sloughing of the aufwuchs mat. Very dilute effluent exposure stimulated aufwuchs productivity.

Larvae of the caddisfly *Gumaga nigracula* were not measurably affected by the Omega-9 water and Unfiltered Omega-9 water concentrations tested, nor by the ammonium carbonate solution. Larvae of the caddisfly *Dicosmoecus gilvipes* were not exposed to the oil shale-related effluents but were noticeably affected by concentrations of ammonium carbonate greater than 2 mM.

ABSTRACT

Accession Number:
@ 721
Rykaczewski, D., 1981, Climate of the Diamond Mountain resource area, final report: Science Applications, Inc., report submitted to Bureau of Land Management, Salt Lake City, Utah, 123 p.

Contact: Bob Ruesink (loan)

Key Categories: CLIMATE, UTAH

Access Code: 112 Use Code: 01

This document provides baseline data on climatology for BLM lands in the Diamond Mountain Resource Area of the Vernal District in Utah.

The data base which has been used to develop this report comprises that available in published form from governmental, academic and private institutions within the State. These sources of data are summarized in the appropriate sections for the following climatic parameters: temperature, frost-free season, precipitation, snowfall, evaporation, solar insolation, hail and surface winds.

The report presents data which represents meaningful (i.e., long-term) and representative time periods. The analysis of the primary climatic parameters, such as temperature, and precipitation, are based on a minimum of 30 years of data or the period of record of the station. Nearly all of these data have been updated through 1970. Shorter periods of record were used for the secondary climatic parameters (e.g. evaporation) due to poor data availability. More recent information may be obtained from the National Climatic Center in Asheville, North Carolina, or through the State Climatologist's Office at Utah State University in Logan.

ABSTRACT

Accession Number:
@ 722
Saether, O.M., 1980, The geochemistry of fluorine in Green River oil shale and oil shale leachates: Ph.D. Dissertation, University of Colorado, Boulder, CO., 232 p.

Contact: University Microfilms International (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 01

This thesis presents the results of a laboratory study to determine the geochemical residence of F in raw oil shales and to delineate the mechanisms of release and uptake of F during the leaching of spent shale. The study used spent shales from the TOSCO II and Paraho processes.

Surface properties of various oil shale materials were quantified. The specific surface area was found to increase with increasing retorting temperature. Electrophoresis measurements showed that raw and spent shales are negatively charged in the alkaline pH range. This precludes absorption by ion-exchange as a major control mechanism on the solubility and mobility of F in the leachates. The geochemical studies revealed that F in oil shale is associated with the ubiquitous micaceous clay minerals.

Studies on the mechanisms of F release and uptake during leaching revealed that most F is released within less than six hours after contact with water. The major control on F solubility is the abundance of Ca. The author proposed that high concentrations of F in oil shale leachates can be controlled with lime.

ABSTRACT

Accession Number:
@ 722.1
Saether, O.M., and Runnells, D.D., 1980, Geochemistry of fluorine in oil shale leachates: in Proceedings of the 13th Oil Shale Symposium, Colorado School of Mines Press, Golden, Colorado, p. 362-368.

Contact: Colorado School of Mines (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 01

Fluorine is an important minor component in oil shale from the Mahogany Zone, in the Piceance Creek Basin in Colorado. It occurs in concentrations up to 2100 ppm in the fresh shale, and it is largely retained in the solid phases of retorted shale. Leachates generated by passing distilled water through retorted shales commonly contain concentrations of dissolved fluorine up to about 30 mg/L, more than an order of magnitude greater than the EPA standard for drinking water. Computer modelling of the aqueous chemistry of such leachates shows that the dissolved fluorine occurs chiefly in the form of free fluoride (F^-) ion, with lesser amounts of dissolved complexes of fluorine with magnesium, calcium, sodium, and other cations. The dissolved fluorine can be removed by exchange on a synthetic anion-exchange resin.

Electrophoresis measurements show that the surfaces of both fresh and retorted oil shale are negatively charged, with a point of zero net charge as low as pH = 2.7. The negative surface charge precludes ion-exchange as a major control on the solubility and mobility of fluoride ion in leachates from oil shale, but specific chemisorption is not precluded. The major control on the solubility of fluorine in the leachates seems to be the abundance of dissolved calcium, with a strong inverse relationship existing between the concentration of dissolved fluorine and dissolved calcium. It is likely that the precipitation of solid fluorite (CaF_2) limits the solubility of fluoride.

ABSTRACT

Accession Number:
@ 723
Sartoris, J.J., April 1976, A mathematical model for predicting river temperature-application to the Green River below flaming Gorge Dam: U.S. Bureau of Reclamation Rep. REC-ERC-76-7, 28 p.

Contact:

Key Categories: UTAH, WYOMING, COMPUTER MODELS, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

The purpose of the model was to evaluate the effect of selective withdrawal modifications at Flaming Gorge dam on tempertatures in the Green River downstream. A computerized mathematical temperature model, incorporating the conservation of heat equation and an equilibrium temperature approach to heat exchange, was developed. The model was calibrated, using 1974 average daily meteorological and hydrological data, to observed temperatures at three river stations, covering a total distance below the dam of 70 kilometers. The average monthly error between predicted and observed mean daily river temperatures at these stations ranged from 0 to - 1.2°C the model was used to simulate river temperatures for the case of only two penstock intake structures modified for selective withdrawal and for all three intakes modified. Simulation results indicate that, while the two-intake modification strategy would result in river temperatures significantly nearer the optimum fishery range than those recorded in 1974, operation with all three intakes modified would generally result in optimum fishery temperatures from May through September. The computer model developed could be adapted to a variety of data and stream conditions.

ABSTRACT

Accession Number:
@ 723.1
Saulnier, G.J., Jr., and Goddard, K.E., March 1982, Use of mathematical models to predict impacts of mining energy minerals on the hydrologic system in northwestern Colorado: in Mining Engineering, p. 285-293.

Contact: George Saulnier (copy)

Key Categories: COLORADO, COMPUTER MODELS, GROUNDWATER QUALITY, SURFACE WATER QUALITY

Access Code: 011 Use Code: 01

The U.S. Geological Survey has developed mathematical modeling techniques to assess potential impacts on the hydrologic system resulting from mining of coal and oil shale in northwestern Colorado. Potential impacts of oil shale mining on groundwater hydrology have been simulated using a quasi-three-dimensional, finite-difference model. The model has been used to simulate hypothetical mine dewatering operations at two proposed oil shale mines. Dissolved-solids distribution and solute transport were simulated with a three-dimensional, finite-difference model that was used to evaluate the effects of flooding in hypothetical abandoned mines. The potential impacts of coal and shale mining on watershed were investigated using a digital watershed model. This deterministic physical-process model predicts responses of the hydrologic system to modifications resulting from mining in basins having snow as the major source of runoff and recharge. Potential impacts of coal development on surface water quality were investigated using a river quality assessment model.

The models developed by the U.S. Geological Survey have been useful in defining the potential effects of mining in northwestern Colorado. They are an important first step in analyzing the existing data base and in predicting impacts and new data needs. The models may not be totally applicable on the local scale but are very meaningful on the regional level.

ABSTRACT

Accession Number:
@ 724
Saulnier, G.J., Jr., 1978, Genesis of the saline waters of the Green River Formation, Piceance Basin, Northwestern Colorado: Ph.D. Dissertation, University of Nevada, Reno, 120 p.

Contact: University Microfilms International (copy)

Key Categories: GROUNDWATER QUALITY, COLORADO, SPRINGS

Access Code: 011 Use Code: 01

This report discusses the geochemical and hydrologic factors that produce saline groundwaters in the Piceance Basin. The study concludes that previous analyses and studies which indicated that water quality of the lower aquifer was primarily a sodium bicarbonate brine over most of the Piceance Basin are misleading. Much of this earlier information came from wells left open to zones of soluble mineral. Careful sampling of drilled wells revealed a much more restricted area of brine occurrence. A large fracture zone on the northern rim of the basin is believed responsible for the present area of brine discharge. The fractures act as vertical planar wells allowing present day continuous dissolution of saline minerals.

The report presents new groundwater quality data, summarizes the locations of some wells in the basin, and presents a mass balance calculation on lower Piceance Creek.

ABSTRACT

Accession Number:
@ 724.1
Schleusener, R.A., and Crow, L.W., Oct. 1961, Analysis of precipitation data in the Upper Colorado River basin: Colorado State University, Civil Engineering Section report, Fort Collins, Colorado, 34 p.

Contact: Wyoming State Engineer Library (loan)
Colorado State University Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 002 Use Code: 03

A sample of daily precipitation and temerature data from 30 weather observing locations in or near the Upper Colorado River Basin have been placed on cards and partially analyzed by computer techniques. The sample represents a total of 1660 station years and analytical conclusions give a good representation of the climatic ranges for this area. Frequency of precipitation at multiple time intervals for each location are presented. Major storms having a recurrence less than once per year have been found to contribute significantly to runoff in the Upper Colorado River. Preliminary techniques for adjusting actual precipitation to more closely relate to runoff are presented and further refinements are anticipated. Variations in moisture sources have been studied.

ABSTRACT

Accession Number:
@ 724.2
Schlotthauer, W.E., Nance, B.W., and Olds, J.D., 1981, Identification and characteristics of aquifers in Utah: Utah Division of Water Rights report, 240 p. plus appendices and plates.

Contact: Jerry Riding (copy)

Key Categories: UTAH, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, PRESENT WATER USE

Access Code: 011 Use Code: 01

The purpose of this report is to identify the groundwater aquifers in Utah, to compile available information and data regarding these aquifers, and to assist in the designation of underground sources of drinking water. The study was funded by the U.S. Environmental Protection Agency (EPA) for the Underground Injection Control (UIC) program.

The state was divided into five study areas: (1) Colorado River Basin; (2) Esclanate - Sevier Desert; (3) Sevier River; (4) Wasatch Range; and (5) West Desert. The report contains a general introduction and description of the study areas and separate sections for each study area which discuss the geology, lithology, groundwater occurrence and movement, aquifer characteristics (transmissivity and coefficient of storage), groundwater quality, and present uses of groundwater. The appendices to this report tabulate municipal well data, chemical analyses of selected water samples, and hydrographs of selected wells and precipitation. The plates include study area and subarea boundaries, areas of groundwater development or potential development, water-level contours, and total dissolved solids contours.

ABSTRACT

Accession Number:
@ 725
Schmehl, W.R., and McCaslin, B.D., 1973, Some properties of spent oil shale significant to plant growth: in Hutnik, R., and Davis, G., eds., Ecology and reclamation of devastated land, Vol 1, London, Gordon and Breach, p. 2742.

Contact: BLM - Vernal (loan)

Key Categories: LEACHING, RECLAMATION, SURFACE

Access Code: 011 Use Code: 02

Spent shales from two pilot plant operations (TOSCO II, USBM) were analyzed for chemical and physical properties that relate to plant growth. The article presents the results of fertility and salinity analyses and of major ion analyses of leachates from six separate samples of spent shale. Column studies were conducted to determine the amount of water required to remove salts from the TOSCO II sample. Plant-growth studies were conducted on one of the materials in greenhouse experiments to determine treatments required to obtain normal plant growth.

ABSTRACT

Accession Number:
@ 726
Schmidt-Collerus, J.J., Bonomo, F., and Prien, C.H., 1974, Polycondensed aromatic compounds (PCA) and carcinogens in the shale ash of carbonaceous spent shale from retorting of oil shale of the Green River formation: American Chemical Society, Division of Fuel Chemistry Preprints, v. 19, no. 2, p. 115-122.

Contact: American Chemical Society (copy)

Key Categories: LEACHING, SURFACE, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This article qualitatively assesses the potential environmental impacts of oil shale development and summarizes preliminary results of a laboratory investigation of polycondensed aromatic compounds in spent shales.

ABSTRACT

Accession Number:
@ 727
Schmidt-Collerus, J.J., and others, 1976, Polycondensed aromatic compounds (PCA) and carcinogens in the shale ash of carbonaceous spent shale from retorting of oil shale: in Yen, T.F., ed., Science and technology of oil shale: Ann Arbor Publishers, Inc., Ann Arbor, MI., p. 115-156.

Contact: Ann Arbcr Publishers (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 02

This article describes the results of research conducted to assess the mobility of and environmental significance of polycondensed aromatic compounds in spent shales from several surface retorting processes. Samples of soil, water, vegetation, and air from various pristine areas of potential future oil shale operations and of spent shales from various pilot plant operations were collected and analyzed for their content of volatile organic and polycondensed aromatic compounds. These studies revealed that several environmental important organic compounds are readily leached from spent shales and are mobile in the environment.

ABSTRACT

Accession Number:
@ 728
Schmidt-Collerus, J.J., Jan. 1974, The disposal and environmental effects of carbonaceous solid wastes from commercial oil shale operations: University of Denver and Denver Research Institute, Denver.

Contact: DRI (loan)

Key Categories: LEACHING, SURFACE,

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 729
Schmidt-Collerus, J.J., Aug. 1975, Synopsis of progress report - characterization of trace organic contaminants in oil shale residues: University of Denver and Denver Research Institute.

Contact: DRI (loan)

Key Categories: LEACHING, SURFACE,

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 729.1
Schuetz, J.R., 1981, Water-resources monitoring in the Powder River, south-central, and southwestern coal regions in Wyoming: project summary in Water-resources investigations of the U.S. Geological Survey in Wyoming, Fiscal Year 1980, Open-File Report 81-20; p. 81-82.

Contact: Joel Schuetz (status)

Key Categories: WYOMING, GROUNDWATER QUANTITY, GROUNDWATER QUALITY , QUANTITY, SURFACE WATER QUALITY, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 01

The objective of the program is to determine the characteristics of the regional water-resources system and to detect and document changes in the system or its components that may be associated with coal mining. The study is being conducted in drainages in northeastern, southcentral and southwestern Wyoming.

The existing water-resources monitoring program will be evaluated for its regional-surveillance value and additional data sites will be added or existing sites upgraded as needed. Data that continuously or periodically describe groundwater levels and quality, and streamflows and their quality will be evaluated so that changes may be detected and documented.

ABSTRACT

Accession Number:
@ 730
Scott, R.C., and Voegeli, P.T., Sr., 1961, Radiochemical analyses of ground and surface water in Colorado, 1954-61: Colorado Water Conservation Board Ground-Water Basic-Data Report 7, 27 p.

Contact: Colorado State Library (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, GROUNDWATER QUALITY

Access Code: 002 Use Code: 02

This report has been prepared to make available to the public data on the occurrence and amounts of natural radioactivity and radioelements in ground and surface waters in Colorado. These samples, representing most of the important beneficially used water supplies in the State and many of the minor sources, were collected by the U. S. Geological Survey, as part of a nation-wide geochemical study of the natural radioactivity of water in the United States. Because of the current interest in radioelements in the human environment, this report will furnish timely data for those concerned with the amounts of radioactivity consumed by the public in their drinking water. These data also are of special interest to those in the fields of health physics, water quality, radioactive waste-disposal, and other fields concerned with the natural occurrence of radioelements.

ABSTRACT

Accession Number:
@ 731
Shanagraw, T.C., 1979, A cost-effective study of treatment alternatives for the purification of oil shale retort waters: M.S. Thesis, University of Colorado, Boulder, Colorado, 186 p.

Contact: Ed Bennett (loan)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 03

This study evaluates a variety of treatment processes that hold promise for upgrading the quality of oil shale retort water. Complete treatment systems were devised that began with pretreatment operations and continued to tertiary treatment stages. Each of these treatment systems was then costed.

This study indicated that the most feasible secondary treatment methods appeared to be distillation and steam stripping. Treatment costs ranged from $4.37 to $6.76 per thousand gallons of water treated for a 50,000 barrel per day in situ oil shale plant that generated two million gallons per day of retort water.

ABSTRACT

Accession Number:
@ 732
Shea, M., and Baumgardner, J., Oct. 1981, Water resources data system user's guide: Water Resources Research Institute, Water Resources Series No. 80.

Contact: Water Resources Research Institute (copy)

Key Categories: WYOMING, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, SPRINGS

Access Code: 011 Use Code: 01

The Water Resources Data System (WRDS) is a computerized data base with flexible methods of retrieval of various resource data. It presently consists of five major data bases: surface water quantity, water quality (surface and ground), climatic, water well levels and snow course.

This report is a user's manual which describes basic retrieval programs, data sources, and programs used to retrieve and manipulate the surface water quantity and quality, well level, climatic and snow course data.

ABSTRACT

Accession Number:
@ 732.1
Shen, H.W., Laronne, J.B., Enck, E.D., Sunday, G., Tanju, K.K., Whittig, L.D., and Biggar, J.W., Aug. 1981, Role of sediment in non-point source salt loading within the Upper Colorado River basin: Fort Collins, Colorado, Water Research Institute Completion Report no. 107, 213 p.

Contact: Environmental Resources Center (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, SEDIMENT

Access Code: 011 Use Code: 01

This report summarizes the results of a research investigation to determine the role of sediment in diffuse-source salt loading of the Upper Colorado River Basin. The program included laboratory and field work to determine: (1) spatial variability of soluble mineral content; (2) variables that control rate of solute pickup; (3) the role of sediment in salt loading of flows over hillslopes; (4) movement of sediment and solutes in streams; (5) magnitude of non-agricultural salt loading; and (6) areas where management and treatment practices are required to reduce salt loading. The work reported here includes the results of three laboratory experiments, two computer simulations, and field studies. The field investigations were conducted in watersheds of Leach Creek and West Salt Creek which are tributaries of the Colorado River west of Grand Junction. The laboratory and field results are broadly applicable to the Upper Colorado River Basin.

The results of the studies summarized in the previous section prove that entrainment and transport of sediment by overland and channelized flow are crucial factors affecting the salinity of runoff from diffuse source areas. Increased concentration of transported sediment increases the availability of soluble minerals. Moreover, transported sediment may continue dissolving due to kinetic disequilibrium and/or when mixed with a more dilute aqueous solution such as water of the Colorado River.

ABSTRACT

Accession Number:
@ 733
Sherman, J.S., and Owen, M.L., Aug. 1977, An investigation of the potential for utilization of saline ground water in energy-related processes, in Proceedings of the Second Pacific Chemical Engineering Congress, v. II, American Institute of Chemical Engineers, New York, New York, p. 1063.

Contact: AIChE (copy)

Key Categories: SALINITY, COLORADO, WYOMING, UTAH

Access Code: 011 Use Code: 02

The feasibility of using water high in total dissolved solids for the major water demands of coal conversion processes has been assessed. Saline western waters, both surface and subsurface, have been identified as potential sources of water for development of western coal reserves. The processes studied include three coal gasification processes, two coal liquefaction processes and coal-fired power generation. Water demands for cooling purposes, steam generation, flue gas cleaning and ash sluicing were assessed both quantitatively and qualitatively and computer simulations of the aqueous inorganic systems were used to define feasibility of saline water use.

ABSTRACT

Accession Number:
@ 733.1
Siemer, E.G., Dec. 1977, Colorado climate: Fort Collins, Colorado, Colorado Experiment Station, Colorado State University, 81 p.

Contact: Bulletin Room (loan)

Key Categories: COLORADO, CLIMATE

Access Code: 011 Use Code: 02

This report presents a broad overview of Colorado's climate. It discusses controls on climate, including latitude, elevation, topography, and others, and it reviews the characteristics of Colorado climate including air pressure, solar radiation, air movement and temperature, precipitation, evaporation, and relative humidity. Each section presents tabular data on a few stations around the state to illustrate the points under discussion. The appendices tabulate detailed data on field crop acreages by county for 1972 and vegetable and fruit crop acreages in 1969. Average annual and monthly temperatures and precipitation at a large number of NOAA stations are summarized, including three in Garfield county and five in Rio Blanco County. Additional information is summarized on temperature as it relates to plant growth and heating and cooling of homes.

ABSTRACT

Accession Number:
@ 734
Sims, P.L., and Redente, E.F., 1977, Rehabilitation potential and practices of Colorado oil shale lands: in Proceedings of the Second Pacific Chemical Engineering Congress, v. I, American Institute of Chemical Engineers, New York, New York, p. 470.

Contact: AIChE (copy)

Key Categories: RECLAMATION, SURFACE

Access Code: 011 Use Code: 02

Considering the problems associated with rehabilitating oil shale disturbed lands in Colorado a research grant was awarded to Colorado State University by the U.S. Energy Research and Development Administration. The goal of this research program is to define the rehabilitation potential and practices of Colorado Oil Shale lands. Rehabilitation guidelines are presently being formulated through the study of long-term fertility requirements, soil microorganism dynamics and activity, rate and direction of secondary plant succession, and selection and improvement of plant materials.

ABSTRACT

Accession Number:
@ 734.1
Sims, P.L., and Redente, E.F., 1974, Revegetation of disturbed surface soils in various vegetation ecosystems of the Piceance basin, final report, Phase II-B to the Colorado Dept. of Natural Resources, Fort Collins, Colorado, Colorado State University, Technical Rep. no. 5, 157 p.

Contact: Environmental Resources Center (copy)

Key Categories: SURFACE, RECLAMATION

Access Code: 011 Use Code: 02

This report summarizes the results of a research program to determine which native and introduced species would be best suited for revegetation of disturbed lands in four vegetation zones typical of the Piceance Basin. The study was aimed at reclamation of lands disturbed by roads, pipelines, or construction activities, or where the topsoil may be used to cover overburden or spent oil shale.

Preliminary results of emergence and survival at each vegetation type appear promising for future revegetation projects. Various wheatgrasses, bromes, and green needlegrass displayed good to excellent emergence and survival at all locations. The forbs and legumes which showed the most success were the vetches, alfalfas, sweetclover, penstemons, Lewis flax, bouncing-bet, and arrowleaf balsamroot. Browse species have been slower to germinate and grow than the grasses and forbes. This has been due to dormancy, poor quality seed, and the loss of seed to birds and rodents. Browse plants which performed the best throughout most locations were Stansbury cliffrose, green ephedra, black chokecherry, antelope bitterbrush, winterfat, and yellowbrush.

ABSTRACT

Accession Number:
@ 735
Sinor, J.E., 1977, Disposal of mine water from a deep oil shale mine: in Proceedings of the Second Pacific Chemical Engineering Congress, v. I, American Institute of Chemical Engineers, New York, New York, p. 437.

Contact: AIChE (copy)

Key Categories: GROUNDWATER QUALITY, COLORADO, EFFLUENTS, SURFACE

Access Code: 011 Use Code: 02

A number of options were examined for the disposal of excess water from a deep room and pillar oil shale mine. High fluoride levels in the water will prevent direct discharge. Evaporation via sprinkler irrigation was the least expensive option but could provide only limited capacity. Defluoridation via ion exchange was technically feasible but expensive. Reinjection into the major producing aquifer was the preferred solution. Computer simulations showed limited pressure effects due to reinjection.

ABSTRACT

Accession Number:
@ 736
Skogerboe, G.V., 1974, Colorado River salinity: impact of Parachute Creek oil shale plant and alternatives for mitigation: in Appendix 12 of An Environmental Impact Analysis for a shale oil complex at Parachute Creek, Colorado. Colony Development Operation, Denver, Colorado 41 p.

Contact: BLM - Vernal (loan)
Engineering Research Center (copy)

Key Categories: COLORADO, SALINITY, ENVIRONMENTAL

Access Code: 011 Use Code: 02

This report evaluates the impact of the Colony oil shale plant on salinity of the Colorado River and proposes alternatives to mitigate adverse impacts.

Various salinity management alternatives for an oil shale water supply were investigated. Most, or all, of the 10 cfs water requirement for the Colony oil shale plant will be diverted from the Colorado River near the town of Grand Valley and conveyed by pipeline to the plant at the headwaters of Parachute Creek. This water depletion will increase the salinity at Hoover Dam by 1/60 of 1 percent, or 0.12 mg/1. If the full water supply is transported by the pipeline, the resulting increase in the salinity might be offset by: (a) irrigation improvements in the Parachute Creek drainage area, under the Larkin Ditch near DeBeque, or in Grand Valley (Grand Junction area); or (b) desalination of either mineralized springs or drainage waters.

Salinity detriments to the Colorado River can also be mitigated by mixing highly saline flows which presently enter the Colorado River with the Colorado River Pumping Pipeline. The most likely source of this highly saline flow would be groundwater supplies in the Parachute Creek drainage area and municipal wastewater from the town of Grand Valley.

ABSTRACT

Accession Number:
@ 737
Skogerboe, G.V., 1974, Chemical water quality characteristics of Parachute Creek: in Appendix 12 of An environmental impact analysis for a shale oil complex at Parachute Creek, Colorado, Colony Development Operation, Denver, Colorado, 31 p.

Contact: BLM - Vernal (loan)
BLM - Craig (loan)
Engineering Research Center (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 011 Use Code: 02

This report summarizes the results of a field sampling program to determine baseline water quality of surface waters in the Parachute Creek drainage basin. Water quality data are presented for 12 stations in the Parachute Creek drainage, as well as three streamflow stations for the period September 1969 to August 1972. The report tabulates results for electrical conductivity, TDS, Ca, Mg, Na, HCO_3, CO_3, Cl, SO_4, NO_3, PO_4, and F. Other, existing stream flow and water quality data for these same stations, previously published by the USGS, are summarized in an appendix.

ABSTRACT

Accession Number:
@ 737.1
Skogerboe, G.V., and Walker, W.R., Aug. 1975, Salinity policy for Colorado River basin: Journal of the Hydraulics Division, ASCE, v. 101, no. HY8, p. 1067-1075.

Contact: G.V. Skogerboe (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, WATER LAW

Access Code: 002 Use Code: 03

Increasing salinity concentrations in the Colorado River are threatening the utility of water resources in the downstream areas of Arizona, California, and Mexico. The U.S. EPA reports that existing damages to lower basin users would increase from $16 million annually in 1970 to $51 million annually by the turn of the century if planned developments do not include appropriate salinity control measures. A brief description of the most important salinity control measures is given along with a short summary of the Colorado River Compact, the upper Colorado River Compact, and the Mexican Water Treaty. The water quality goal for the Colorado River of maintaining salinity concentrations in the lower stem at or below present levels would be better than setting numerical standards. This policy should be applied to each state by offsetting salinity detriments resulting from each new development with salinity control measures that will maintain a net salt balance leaving state boundaries.

ABSTRACT

Accession Number:
@ 737.2
Skogerboe, R.D., Berg, W.A., and McWhorter, D.B., 1981, Field level characterization of solid residues from oil shale retorting: in Proceedings of symposium on potential health and environmental effects of synthetic fossil fuel technologies, Rep. CONF-0780903, 193-198 p.

Contact: NTIS (copy)

Key Categories: SURFACE, LEACHING

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 738
Skogerboe, R.K., Lavallee, C.S., Miller, M.M., and Dick, D.L., 1979, Environmental effects of oil shale mining and processing, Part III - The water quality of Piceance Creek, Colorado, prior to oil shale processing: EPA-600/3-79-055, 59 p.

Contact: NTIS (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 002 Use Code: 01

Water quality data have been collected at seven sites along Piceance Creek and at one site each along Stewart, Black Sulphur, and Yellow Creeks in the Piceance Basin, Colorado, during 1975-1977. Piceance, Stewart, and Yellow Creeks may be perturbed by oil shale industry activities on the two tracts, C-a and C-b, currently under development. The preoperational water quality is generally poor due to higher levels of dissolved solids, manganese, and both dissolved and suspended iron. It further declined farther downstream primarily due to influxes from groundwater aquifers in contact with soluble mineral beds. The levels of aluminum, cadmium, chromium, lead, and boron were below the detection limits of the analysis method used. These were typically below the permissible levels set for aquatic life by factors of 5-10. The levels of copper, zinc, arsenic, selenium, and mercury were usually measurable but still below permissible.

ABSTRACT

Accession Number:
@ 739
Slawson, G.C., Jr., 1981, Analysis of groundwater quality sampling methods: in Proceedings of the 14th Oil Shale Symposium, Colorado School of Mines Press, Golden, Colorado, p. 401-409.

Contact: Butch Slawson (copy)
Colorado School of Mines (copy)

Key Categories: GROUNDWATER QUALITY, COLORADO

Access Code: 011　　　　Use Code: 01

In the complex hydrogeology of the Piceance Basin Colorado and in the oil shale region in general, the location and construction of monitoring wells play a significant role in determining the nature of the water quality data collected. In addition, the methods used to collect samples have an appreciable influence on monitoring data.

Data collected by pumping of alluvial wells on Tract C-b and USGS deep aquifer wells in the Piceance Basin indicate that appreciable changes in water quality can occur during the pumping period. When wells are bailed to collect samples, care must be taken to collect samples consistently from the same aquifer interval. Vertical profiles of water quality measured on Tract C-a show significant changes with depth in deep aquifer wells.

ABSTRACT

Accession Number:
@ 739.1
Slawson, G.C., Jr., ed., 1980, Monitoring groundwater quality: The impact of in-situ oil shale retorting: General Electric. - TEMPO Report GE78TMP-103, Santa Barbara, CA prepared for U.S. EPA, 279 p.

Contact: Butch Slawson (copy)

Key Categories: COLORADO, IN-SITU, EFFLUENTS, LEACHING, ENVIRONMENTAL, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

This report presents the initial phase of a research program which will develop a planning methodology for the design and implementation of cost-effective groundwater quality monitoring programs for modified in-situ (MIS) oil shale retorting. This initial phase includes (1) a review of MIS development with regard to potential impacts and a review of current MIS monitoring programs, and (2) identification of key issues, uncertainties, and unknowns with regard to design and implementation of monitoring programs. In addition, this report presents a preliminary study program for Phase II of the research effort. Phse II will develop support data to finalize recommendations for monitoring the impact of MIS retorts.

The report includes individual sections on: potential sources of pollution and methods of disposal; potential pollutants; groundwater use; hydrogeologic framework; existing water quality; potential pollutant mobility; preliminary priority ranking of potential pollution sources; evaluation of existing monitoring programs; monitoring approaches; and monitoring design programs. An appendix presents three conceptual models of pollutant mobility.

ABSTRACT

Accession Number:
@ 740
Slawson, G.C., Jr., ed., Jan. 1979, Groundwater quality monitoring of western oil shale development: Identification and priority ranking of potential pollution sources: Rep. EPA-600/7-79-023, 214 p.

Contact: Butch Slawson (copy)

Key Categories: GROUNDWATER QUALITY, UTAH, SUBSIDENCE, SURFACE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, LEACHING

Access Code: 011

Use Code: 01

This report presents the development of a preliminary priority ranking of potential pollution sources with respect to groundwater quality and the associated pollutants for oil shale operations such as proposed for Federal Prototype Leases U-a and U-b in Eastern Utah. The methodology used includes description of background information and the proposed oil shale operations as potential pollution sources, characteristics of potential pollutants, area water use, the hydrogeologic framework of the project area, and existing water quality. This information base is then used to evaluate the potential mobility of pollutants in the subsurface through consideration of infiltration, and mobility and attenuation processes in unsaturated and saturated zones. These facts lead to the preliminary priority ranking based on the magnitude of the sources; the toxicity, persistence, etc., of the potential pollutants; the mobility of pollutants in the subsurface; and the potential for harm to water users.

These preliminary results rank the processed shale disposal area, plant process area, and the retention dam area as the general order of priority for monitoring. Within each of these sources areas, individual pollution sources are also ranked with regard to monitoring priority and individual pollutant constituents are also ranked.

ABSTRACT

Accession Number:
@ 740.1
Slawson, G.C., Jr., and Yen, T.F., eds, Jan. 1979, Compendium reports on oil shale technology: Rep. EPA-600/7-79-039, 202 p.

Contact: Ed Bates (copy)

Key Categories: EFFLUENTS, SURFACE, IN-SITU, PROCESS WATER USE

Access Code: 011 Use Code: 02

This compendium of individual reports reviews various oil shale production processes (mining, retorting, oil upgrading) and key environmental issues (organic and inorganic characterization of products, environmental control). Chapters are included on oil shale development (reserves, geology); mining processes (underground, surface, in-situ); kerogen recovery processes (Paraho, TOSCO II); hydrogenation; organic contaminants; and environmental controls. This report compiles a wealth of published and unpublished chemical characterization data on shale oils and retort waters.

ABSTRACT

Accession Number:
@ 741
Smith, R.J. & Assoc., 1965, Water resources inventory, water division No. 4, including Green River, Bear River, Snake River drainages and Red Desert Basin and the Little Snake River drainage in water division No. 1: Wyoming State Engineer, 43 p.

Contact: BLM - Cheyenne (loan)

Key Categories: WYOMING, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 152 Use Code: 03

This report, prepared in conjunction with three other reports covering the rest of the state, covers the southwestern portion of the state. The basic approach has been to review all available information on existing water use and resources in order that a proper determination could be made of existing and needed basic data so that the correct background information for future planning could be established.

ABSTRACT

Accession Number:
@ 742
Smith, V.E., 1976, The application of HYMO to study areas of southwestern Wyoming for surface runoff and soil loss estimates: Wyoming Water Resources Research Institute Water Resources Series No. 60, 21 p.

Contact: Wyoming Water Resources Research Institute (loan)

Key Categories: WYOMING, COMPUTER MODELS, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

Ephemeral stream runoff and soil losses were estimated for small study basins in southwestern Wyoming using HYMO, a computer model that computes runoff and soil loss from precipitation and basin characteristics. Computed runoff was compared to measured runoff in one basin and a sensitivity analysis was made of the model. The comparison and analysis pointed out critical input variables requisite to reliable results. Runoff and soil loss graphs were prepared for the study basins as indicators of the effects of changes in range management practices.

ABSTRACT

Accession Number:
@ 743
Smith, Verne E., July 1974, Characteristics of Wyoming stock-water ponds and dike spreaders systems: Wyoming Water Resources Reseach Institute, Water Resources Series No. 47, 41 p.

Contact: none

Key Categories: WYOMING, AVAILABLE WATER, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 02

Based on information from all available studies, an evaluation was made of the characteristics and hydrologic processes related to Wyoming stock-water ponds and dike spreader systems. Capacity curves for various configurations of stock-water ponds were developed and maps of average annual evaporation, precipitation and runoff were compiled. The amount of water constituting beneficial use was examined and recommendations relative to water rights administration are presented.

ABSTRACT

Accession Number:
@ 744
Smith, Verne E., and Quan, D.A., 1974, Forecasting water demand in Wyoming with the main II system: A completion report in project No. B-009-WYO, Univ. of Wyoming, Water Resources Research Institute, 251 p.

Contact: none

Key Categories: WYOMING, COMPUTER MODELS, PRESENT WATER USE

Access Code: 182 Use Code: 03

This project tested the applicability of the MAIN II (Municipal and Industrial Needs) Water Forecasting System to five Wyoming communities: Cheyenne, Casper, Glenrock, Rock Springs and Green River which are fairly representative of western communities. Errors found in the MAIN II program were corrected, and the program was modified. Certain kinds of data were difficult to obtain for the five communities. Using a base year, forecasts were made and compared with actual water demands. Three optional MAIN II projection methods (internal growth model, historical extrapolation of data and external projection) were tested. The results showed the latter two methods to be fairly reliable. The internal growth models were not representative of Wyoming cities due to the atypical growth patterns of Wyoming communities.

ABSTRACT

Accession Number:
@ 745
Smith, V.E., 1974, Surface water system - 1973: Wyoming Water Resources Research Institute, Water Resources Series No. 43, 111 p.

Contact: Wyoming Water Resources Research Institute (loan)

Key Categories: WYOMING, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, COMPUTER MODELS

Access Code: 011 Use Code: 03

A computerized system (SWS) to store, retrieve, massage, and output Wyoming surface water records was developed in the late 1960's at the Wyoming Water Resources Research Institute through financial support of the Wyoming Water Planning Program of the State Engineer's Office. SWS has been described in two reports (Embree and Larson, 1970; Embree and Cole, 1970), but numerous additions and revisions have made it desirable to update those reports in order that potential users may become aware of the present SWS capabilities.

This report updates previous publications, describing available analyses and data. An appendix lists mean daily flow data and reservoir stations on SWS.

ABSTRACT

Accession Number:
@ 746
Smith, V.E., Anderson, D.A., and Scott, R.G., 1973, An elevation dependent model for estimating annual runoff: University of Wyoming, College of Commerce and Industry, 28 p.

Contact: none

Key Categories: COMPUTER MODELS

Access Code: 182 Use Code: 02

Numerous studies have been made relating streamflow to physical characteristics of drainage basins. Many of the characteristics, such as vegetation, topography, geologic formation, soils, and climatic factors may be homogeneous within certain elevations for at least one side of a mountain range and perhaps for mountainous areas in an entire region. Thus, it may be possible to decompose runoff into components corresponding to different elevations. A study (4) relating elevation bands to assumed inches of runoff for each elevation band produced fairly good results for mean annual runoff. However, since climatic conditions vary considerably from year to year, it should be possible to improve the estimate of mean annual runoff by determining individual yearly values. Such values would also be useful for operational water resource studies and be of interest for indicating the runoff contribution in each elevation band. To examine this possibility, a model to estimate annual streamflow from elevation bands is presented and applied to a set of drainage basins.

ABSTRACT

Accession Number:
@ 746.1
Soil Conservation Service, 1981, Draft supplement to the Colorado River water quality improvement program, final environmental statement for Lower Gunnison Basin Unit, Montrose and Delta Counties, Colorado and Uintah Basin Unit, Duchesne, Wasatch and Uintah Counties, Utah.

Contact: Soil Conservation Service - Salt Lake City (copy)

Key Categories: UTAH, SALINITY, ENVIRONMENTAL

Access Code: 011 Use Code: 02

This is a draft environmental impact statement which evaluates the cumulative effects of implementing on-farm irrigation water management and land treatment measures in the Lower Gunnison and Uintah Basin sections of the Colorado River Basin. The affected environment and various alternatives are described for each section, and environmental consequences are discussed. Appendices present water and salt budgets for each alternative and matrices of environmental effects.

ABSTRACT

Accession Number:
@ 746.2
Soil Conservation Service, 1979, U.S.D.A. salinity report for the Unitah Basin Unit, Utah, Colorado River basin salinity control study, State of Utah: 54 p. plus appendices A-G.

Contact: Soil Conservation Service - Salt Lake City (copy)

Key Categories: UTAH, SALINITY, PRESENT WATER USE

Access Code: 011 Use Code: 02

This report presents alternative plans for improvements to on-farm irrigation systems and estimates the effects of these improvements on salinity in the Uintah Basin unit. The climate, topography geology, soils and other baseline conditions in the study area are described and the origin of salt from the unit was delineated. The study area was divided into units and on-farm inventories were conducted to obtain additional information on crop types and yields, water deliveries, conservation projections, and canal systems. Water and salt budgets were calculated for each of these units. An inventory of wildlife and wetlands habitat was also conducted. Appendices summarize the geology and soils in the area, present the results of the drain and biological resources inventory, present the salt and water budgets, and summarize an inventory of critical erosion areas.

ABSTRACT

Accession Number:
@ 747
Soil Conservation Service, Snow Survey Unit, Summer 1978, Summary of snow survey measurements for Colorado and New Mexico, 1971-1977.

Contact: BLM - Craig (loan)

Key Categories: CLIMATE, COLORADO

Access Code: 102 Use Code: 01

This report lists the summary of snow depth and water content measurements for all snow courses in Colorado and New Mexico. The dates covered in this report are from 1971 through 1977 and are the continuance of the previous summary. The last summary covered the period 1936 through 1972.

This report lists two averages. The first average is for all the years of record, not just the years shown in the report. The second average is for the 15-year period 1963 through 1977.

ABSTRACT

Accession Number:
@ 748
Soil Conservation Service, Snow Survey Office, 1977, List and location of snow courses and snotel sites.

Contact: BLM - Craig

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 100 Use Code: 03

ABSTRACT

Accession Number:
@ 749
Soil Conservation Service, 1967, Precipitation frequency maps for Colorado: prepared by Special Studies Branch, Office of Hydrology, Environmental Services Admin., Weather Bureau for Engineering Division, U.S. Dept. of Agriculture.

contact: NTIS (copy)

Key Categories: COLORADO, CLIMATE

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 749.1
Sokol, D., 1976, Hydrologic model, Piceance Basin, Colorado, used to simulate dewatering of tract C-a: Morrison-Knudsen Co., Inc., prepared for Rio Blanco Oil Shale Project Job No. 1023-45, p.35.

contact: none

Key Categories: COLORADO, COMPUTER MODELS, EFFLUENTS, IN-SITU

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 750
Spahr, N.E., 1981, Streamflow analysis, Piceance Creek and Yellow Creek drainage basins: in Water-resources investigations of the U.S. Geological Survey in Colorado - fiscal year 1981, U.S. Geological Survey Open-File Report 81-150, p. 102.

Contact: Norman Spahr (status)

Key Categories: COLORADO, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 01

The purpose of this program is to define the natural and existing streamflow regimes of the Piceance and Yellow Creek drainages. An investigation of stream gains and losses will be conducted. Modeling and statistical techniques will be used to analyze current data networks and to identify data deficient areas. Average and peak-flow conditions will be determined using the USGS daily flow snowmelt model and the peak-flow model. Regional regression models will be developed to transfer hydrologic information from one drainage to another and low flows will be measured to determine the relationship between groundwater and surface water.

ABSTRACT

Accession Number:
@ 750.1
Spall, N.D., Jan. 1981, Analytical chemistry of oil shale process waters: in Holland, L.M., and Stafford, C.G., eds., The Los Alamos intergrated oil shale health and environmental program: a status report, Rep. LA-8665-SR, p. 74.

Contact: Dale Spall (copy)

Key Categories: EFFLUENTS, SURFACE, IN-SITU

Access Code: 011 Use Code: 01

Product waters from the Paraho separation tanks, from the Occidental Room 6 modified in-situ burn, and from the Geokinetics Retort 17 true in-situ burn have been studied by glass-capillary, gas-chromatography mass-spectrometry to identify and quantitate organic compounds present. Some preliminary conclusions and characterization data are presented in this report. A more detailed scientific report is presently being written and will be released in 1982. This report will contain the detailed characterization data on these waters. The majority of the work was done on Paraho process water.

The following tentative conclusions may be drawn from a comparison of the three waters. The Paraho water contains relatively large amounts of carboxylic acids, amides and nitriles, when compared to the other two waters. All three waters contain about the same quantities of furans, pyranzenes, ketones, thiazoles, phenols, thiophenes, and alcohols. Classes of compounds and their approximate concentration levels for the Paraho water are: acids (10,000-20,000 ppm) > amides (500-5000 ppm) > nitriles (500-1000 ppm) = ketones > alcohols (10-500 ppm) > furans (10-250 ppm) > phenols (10-100 ppm) = thiophenes = benzothiophenes = pyrazmes > thiazoles (10-50 ppm) = pyridines = pyroles = indenes = anilines. This ordering corresponds to the probable concentration of individual compounds within that class, and not to the concentration of the compound class. For example, in the Paraho water, the nine carboxlic acids have a total concentration of about 5 weight percent; thus nearly 70% of the TOC is found in this single class of compounds.

ABSTRACT

Accession Number:
@ 751
Sparks, F.L., 1974, Water prospects for the emerging oil shale industry: in Quarterly of the Colorado School of Mines, v. 69, no. 2, Colorado School of Mines Press, Golden, Colorado, p. 93-101.

Contact: Colorado School of Mines (copy)

Key Categories: AVAILABLE WATER BY BASIN, PRESENT WATER USE, PROCESS WATER USE, COLORADO, SURFACE

Access Code: 011 Use Code: 02

This article reviews estimates of consumptive use by a one-million barrel per day oil shale industry in the early 1970s and discusses various options to supply this water in the Grand Valley region and in the White River basin. The viewpoint expressed is that of the Colorado Water Conservartion Board. The author concludes that there should be no problem in providing an adequate water supply for a mature oil shale industry in the Grand Valley area but that, in the White River area (Piceance Basin), water supply may pose a considerable problem. In the Grand Valley region, developers could purchase water from existing federal reclamation projects (Green Mountain Reservoir, Ruedi Reservoir, West Divide) or could purchase existing privately owned water rights.

ABSTRACT

Accession Number:
@ 751.1
Sparks, F.L., 1974, Water and the oil shale industry in Colorado: Proceedings of the synthetic hydrocarbons conference, New York, American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc., 91-93 p.

Contact: NTIS (copy)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, SURFACE, PROCESS WATER USE

Access Code: 002 Use Code: 02

Results of four studies on water requirements of an oil shale industry in Colorado are given. These estimates range from 130,000 acre feet/year in 1959 to 175,00 acre feet/year in 1974. It is pointed out that current figures would probably be higher. It is concluded that 250,000 acre feet/year of water could be made available to a mature oil shale industry.

ABSTRACT

Accession Number:
@ 751.2
Spofford, W.O., Jr., Parker, A.L., and Kneese, A.V., eds., 1980, Energy development in the southwest, problems of water, fish, and wildlife in the Upper Colorado River basin, resources for the future: Baltimore, Maryland, The Johns Hopkins University Press..

Contact: none

Key Categories: COLORADO, UTAH, WYOMING, ENVIRONMENTAL, AVAILABLE WATER BY BASIN, PRESENT WATER USE, PROCEEDINGS

Access Code: 002 Use Code: 02

This book presents technical papers and discussion on a number of relevant water resources topics. The topics covered by this volume include physical and ecological aspects of the Upper Colorado River Basin, energy development scenarios for the Four Corners states and the Upper Colorado River Basin, and potential impacts of energy development on population growth and the economy of the Four Corner states.

ABSTRACT

Accession Number:
@ 751.3
Spradlin, H.K.L., Oct. 1980, Meteorological and climatological investigation: review of Jan.-June 1979 investigative period: U.S. DOE Rep. LETC-10787-53, 120 p.

Contact: NTIS (copy)
Neil Young (loan)

Key Categories: UTAH, CLIMATE

Access Code: 002 Use Code: 01

This report summarizes the result of a meteorological investigation at the Geokinetics experimental site in Uintah County, Utah from January 1 through June 30, 1979. Data from two electrical weather stations and six mechanical microclimatological stations are presented. Tabular and/or graphical summaries are presented for: maximum and minimum temperatures, daily mean temperature, composite profiles, wind roses, wind speed and direction by hour, temperatures at 100 - 10 ft by hour and lapse rate at 100 - 30 ft by hour. This report is also included as an appendix to Mankowski and Hutchinson, Nov. 1979.

ABSTRACT

Accession Number:
@ 752
Spradlin, H.K.L., 1979, Meteorological and climatological investigation - review of January - June, 1979 investigative period: Geokinetics report to Laramie Energy Technology Center, 2 vols.

Contact: none

Key Categories: CLIMATE, UTAH

Access Code: 002 Use Code: 01

This report summarizes the result of a metereological investigation at the Geokinetics experimental site in Uintah County, Utah, from January 1 through June 30, 1979. Data from two electrical weather stations and six mechanical microclimatological stations are presented. Tabular and/or graphical summaries are presented for: maximum and minimum temperatures, daily mean temperatures, composite profiles, wind roses, wind speed and direction by hour, temperatures at 100 - 10 ft. by hour, and lapse rate at 100 - 30 ft. by hour. This report is also included as an appendix to Mankowski and Hutchinson, Nov. 1979.

ABSTRACT

Accession Number:
@ 753
Spradlin, H.K.L., 1979, Well level monitoring investigation, Series 1, Series 2, and supplemental well series final review: prepared for the U.S. Department of Energy by Geokinetics under Cooperative Agreement DE-FC20-78LC10787.

Contact: Ed Mead (loan)

Key Categories: GROUNDWATER QUANTITY, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 01

As part of an effort to determine ground water impacts associated with in-situ oil shale retorting, this study documents the results of a water level monitoring program at the Geokinetics site. Thirty-three monitoring wells (designated Series 1) were established in or near in-situ retorts which had been blasted. Thirteen wells (designated Series 2) were established in areas not affected by blasting. An additional fourteen wells (designated supplemental wells) were established in existing core holes throughout the section. Sampled intervals for the above wells were above, below or within the Mahogany Zone. Water level monitoring was conducted between January, 1978 and February, 1979 for Series 1 wells; June 1978 to at least June 1979 for Series 2 wells; and June, 1978 to December, 1978 for supplemental wells.

Major conclusions of the study are: (1) retort blasting does increase horizontal permeability and possibly, vertical permeability; (2) there is perched water above the Mahogany bed, but horizontal and vertical permeabilities are low in this zone; (3) horizontal permeabilities are quite low in the Green River Formation throughout the section occupied by Geokinetics; and (4) there appear to be seasonal variations in water levels, but the variance is not statistically significant.

ABSTRACT

Accession Number:
@ 754
Spradlin, H.K.L., and D. Lundberg, 1980, Meteorological and climatological Investigation - review of July - December, 1979 investigative period: U.S. DOE Rep. LETC-10787-63, 2 vols.

Contact: Neil Young (loan)
NTIS (copy)

Key Categories: CLIMATE, UTAH

Access Code: 002 Use Code: 01

This report summarizes the result of a meteorological investigation at the Geokinetics experimental site in Uintah County, Utah, from July 1 through December 31, 1979. Data from two electrical weather stations and six mechanical microclimatological stations are presented. Tablular and/or graphical summaries are presented of maximum and minimum temperatures, daily mean temperatures, composite profiles, and wind roses.

ABSTRACT

Accession Number:
@ 755
Spradlin, H.K.L., Hutchinson, D.L., and Mankowski, S.G., 1979, Environmental research plan for the Geokinetics Inc. investigation of the horizontal in-situ oil shale retorting process, research program outline U.S. DOE Rep. DOE/LC/10787-69, 52 p.

Contact: NTIS (copy)

Key Categories: ENVIRONMENTAL, UTAH

Access Code: 011 Use Code: 02

This report represents an outline of Geokinetics' operating plan and intended environmental research program. The summary of intended environmental programs includes sections on atmospheric research, hydrologic research, ecological research, and cultural-economic research. For each major category, the existing environment is briefly described, and plans for environmental monitoring and modeling are detailed. The environmental program is intended to ensure that the development of the in-situ retorting process does not cause significant adverse impacts on the environmental resources of the area.

ABSTRACT

Accession Number:
@ 755.1
SRI International, Jan. 1980, Environmentally based siting assessment for synthetic-liquid-fuels facilities: Rep. DOE/EV-10287, 507 p.

Contact: NTIS (copy)

Key Categories: ENVIRONMENTAL, COLORADO, UTAH, WYOMING

Access Code: 002 Use Code: 01

A detailed assessment of the major environmental constraints to siting a synthetic fuels industry and the results of that assessment are used to determine on a regional basis the potential for development of such an industry with minimal environmental conflicts. Secondly, the ability to mitigate some of the constraining impacts through alternative institutional arrangements, especially in areas that are judged to have a low development potential is also assessed. Limitations of the study are delineated, but specifically, the study is limited geographically to well-defined boundaries that include geographically to well-defined boundaries that include the prime coal and oil shale resource areas. The critical factors used in developing the framework are air quality, water availability, socioeconomic capacity, ecological sensitivity, environmental health, and the management of Federally owned lands.

ABSTRACT

Accession Number:
@ 756
Stamm, G.G., July 1975, Salinity countdown on the Colorado: in
Water International, p. 9-14.

Contact: Denver Public Library (loan)

Key Categories: SALINITY, WATER LAW, COLORADO, WYOMING, UTAH

Access Code: 011 Use Code: 03

This article presents a historical overview of the salinity of the Colorado River within the framework of the compacts and treaties that regulate it. It discusses the causes of salinity and overviews the U.S. Department of Interior program to solve these problems.

ABSTRACT

Accession Number:
@ 756.1
Stanwood, R.M., Jan. 1981, Environmental issues: still clouded in uncertainty: Mining Engineering, v. 33, no. 1, p. 49-51.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, UTAH, ENVIRONMENTAL, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 02

Environmental impact of shale oil development is discussed. Federal and state agencies have determined that the upper Colorado River basin water supplies can support a 500,000 barrel per day shale oil industry to the year 2000 without curtailing other uses. However, in case of short supply or adverse weather, the shale oil industry would receive diminished supplies unless other water rights were negotiated. Water quality may be adversely affected by disruption during processing, pollution by mine waste and contamination by spent shale leachates. Possible salinity increases from water withdrawal and salt contamination in the Colorado River basin could cause economic losses. The EPA is currently preparing oil shale pollution control guidance documents, which will be available in 1981. It is expected that the shale oil developer will still face many regulations and uncertainties.

ABSTRACT

Accession Number:
@ 756.2
Stauffer, N.E., Jr., 1981, Utah-Colorado White River simulation users manual: Utah Division of Water Resources.

Contact: Utah Division of Water Resources (copy)

Key Categories: UTAH, COLORADO, COMPUTER MODEL

Access Code: 000 Use Code: 01

ABSTRACT

Accession Number:
@ 757

Stead, F.W., Ege, J.R., and Welder, F.A., 1967, Geology and hydrology of Piceance Creek basin, in the Bronco Oil Shale Study: U.S. Geological Survey Open-File Report PNE-1400, p. 50.

Contact: Open-file Services Section (copy)

Key Categories: COLORADO, GROUNDWATER QUANTITY, SURFACE WATER QUANTITY

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 757.1
Steele, R.V., and others, Jan. 1980, Leading trends in evnironmental regulation that affect energy development, Final Report: Rep. DOE/EV-01682, 249 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL, WATER LAW

Access Code: 002 Use Code: 02

Major environmental issues that are likely to affect the implementation of energy technologies between now and the year 2000 are identified and assessed. Addressed are: oil recovery and processing; gas recovery and processing; coal liquefaction; coal gasification (surface); in situ coal gasification; direct coal combustion; advanced power systems; magnetohydrodynamics; surface oil shale retorting; true and modified in situ oil shale retorting; geothermal energy; biomass energy conversion; and nuclear power (fission). Environmental analyses of these technologies included, in addition to the main processing steps, the complete fuel cycle from resource extraction to end use. A comprehensive survey of the environmental community (including environmental groups, researchers and regulatory agencies) was carried out in parallel with an analysis of the technologies to identify important future environmental issues. Each of the final 20 issues selected by the project staff has the following common attributes: consensus of the environmental community that the issue is important; it is a likely candidate for future regulatory action; it deals with a major environmental aspect of energy development. The analyses of the 20 major issues address their environmental problem areas, current regulatory status, and the impact of future regulations. These analyses are followed by a quantitative assessment of the impact on energy costs and nationwide pollutant emissions of possible future regulations. This is accomplished by employing the Strategic Environmental Assessment System (SEAS) for a subset of the 20 major issues. The report concludes with a more general discussion of the impact of environmental regulatory action on energy development.

ABSTRACT

Accession Number:
@ 757.2
Steele, T.D., 1979, An overview of techniques of river-basin assessment in an energy-impacted region--Yampa River basin, Colorado and Wyoming: Water Supply and Management, v. 3, n. 3, p. 151-171

Contact: Denver Public Library (loan)

Key Categories: WYOMING, ENVIRONMENTAL

Access Code: 002 Use Code: 02

Reported are the results of completed basin assessment studies of the Yampa River Basin that had as their objectives (1) to evaluate the environmental and economic impact of regional energy and water resource development for existing and feasible alternative policies, and (2) to describe the assessment methodologies used so that they may be applied to other energy-rich regions of the West where water resources are limited. A set of 7 coal-resource development alternatives are specified in order to evaluate the effects of possible water demands and generated residuals on the region's water resources. The resultant analyses consider both the direct effects of coal mining, processing, conversion and transportation and the indirect effects of increased population and related commercial and service needs. Based upon extensive field collection of hydrologic data and the analysis of regional economic projections, a range of impacts of the projected development of the basin's water resources are evaluated using several data-analysis and physical modelling techniques.

ABSTRACT

Accession Number:
@ 758
Steele, T.D., 1976, Coal-resource development alternatives, residuals management, and impacts on the water resources of the Yampa River basin, Colorado and Wyoming: in Symposium on Water Resources and Fossil Fuel Production, Sept. 7-8, 1976, International Water Resources Association, Dusseldorf, Germany.

Contact: USGS Library (loan)

Key Categories: WYOMING, ENVIRONMENTAL

Access Code: 002 Use Code: 03

Development of coal resources in the Yampa River basin in the southern Rocky Mountains of the United States will have a variety of effects on available water resources. These involve both direct effects caused by coal extraction, processing, transport, and conversion techniques utilized or proposed for the region and also indirect effects associated with regional economic growth. Impacts from both types of effects involve water resources of the basin in terms of water withdrawals, consumptive use, and assimilative capacities of discharged residuals (that is, noneconomic by-products). A regional residuals-management analysis involves assessing mass and energy balances of the primary economic activities, as well as an economic and technical evaluation of alternative strategies of treatment and modification of residuals discharged to the environment from various sources. Constraints on viable alternatives include considerations of (1) capital and operating costs of facilities, (2) treatment technologies, (3) water rights, and (4) environmental standards. Approaches and results to date of residuals-management and environmental-modeling techniques are described for evaluating water-resources impacts of coal-related development in the Yampa River basin, Colorado and Wyoming.

ABSTRACT

Accession Number:
@ 759
Steele, T.D., Bauer, D.P., Wentz, D.A., and Warner, J.W., 1979, The Yampa River basin, Colorado and Wyoming--A preview to expanded coal-resource development and its impacts on regional water resources: U.S. Geological Survey Water-Resources Investigations 78-126, 133 p.

Contact: Public Inquiries Office (copy)

Key Categories: WYOMING, COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 02

Expanded coal production and conversion in the Yampa River basin, Colorado and Wyoming, may have substantial impacts on water resources, environmental amenities, and socioeconomic conditions.

Preliminary results of a 30 year assessment by the U.S. Geological Survey are given for evaluation of surface and groundwater resources using available data, modeling analysis of waste-load capacity of a Yampa River reach affected by municipal wastewater-treatment plant effluents, and semi-quantitative descriptions of ambient air-and water-quality conditions. Aspects discussed are possible constraints on a proposed development due to basin compacts and laws regulating water resources, possible changes in environmental-control regulations, and policies on energy-resource leasing and land use that will influence regional economic development.

ABSTRACT

Accession Number:
@ 760
Steele, T.D., Bauer, D.P., Wentz, D.A., and Warner, J.W., 1976, An environmental assessment of impacts of coal development on the water resources of the Yampa River basin, Colorado and Wyoming--phase-I work plan: U.S. Geological Survey Open-File Report 76-367, 17 p.

Contact: Open-File Services Section (copy)

Key Categories: WYOMING, ENVIRONMENTAL

Access Code: 011 Use Code: 03

Coal resources of the western United States are being developed at ever-increasing rates, causing concerns of the effects of mining and associated activities on the environment. The Yampa River basin in northwestern Colorado and south-central Wyoming is undergoing economic development of its coal, oil and gas, and uranium resources.

The Yampa River basin assessment is a 2½-year program of the U.S. Geological Survey. It is designed primarily to assess the availability and quality of the basin's water resources. The basin assessment also will evaluate potential environmental and selected socioeconomic impacts of energy-resource development plans proposed by mining and power companies. This report serves as a project work plan for the basin assessment's first-phase work activities.

Economic development in the Yampa River basin will result in higher levels of residuals (noneconomic byproducts) being discharged into the environment. Residuals-management encompasses the technological and economic interrelationships that should be considered in order to comply with Federal and State environmental-control regulations regarding air quality, water quality, and disposal of solid wastes. The basin assessment, the first phase that is described by this report, is designed to provide Federal, State, and local decision-makers with the basic environmental information needed to formulate and to evaluate policies for the development of energy resources. The techniques applied and conclusions reached in the Yampa River basin assessment should aid similar studies of other energy-rich basins in the western United States.

ABSTRACT

Accession Number:
@ 761
Steele, T.D., and others, 1976, An environmental assessment of impacts of coal development on the water resources of the Yampa River basin, Colorado and Wyoming--phase II work plan: U.S. Geological Survey Open-File Report 76-368, 33 p.

Contact: Open-File Services Section (copy)

Key Categories: WYOMING, COLORADO, ENVIRONMENTAL

Access Code: 002 Use Code: 03

The Yampa River Basin Assessment is a 2½-year program of the U.S. Geological Survey. It is designed primarily to assess the availability and quality of the basin's water resources. The basin assessment also will evaluate potential environmental and selected socioeconomic impacts of energy-resource development plans proposed by mining and power companies. This report serves as a project work plan for the basin assessment. It describes the program objectives, and the various approaches of analysis and evaluation. Environmental studies are outlined for analyzing both the direct effects of various proposals regarding coal mining, transportation, and conversion, and the secondary effects resulting from increased population and urban growth.

ABSTRACT

Accession Number:
@ 761.1
Steele, T.D., Gilroy, E.J., and Hawkinson, R.O., Aug. 1974, An assessment of areal and temporal variations in streamflow quality using selected data from the National Stream Quality Accounting Network: U.S. Geological Survey Open-File Report 74-217, 210 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, UTAH, SURFACE WATER QUALITY

Access Code: 002 Use Code: 03

Streamflow chemical-quality data and stream-temperature data at 88 stations throughout the United States and Puerto Rico were analyzed to develop and to evaluate methodologies for the general assessment of the variation of the Nation's streamflow quality conditions in space and over time. The spatial variation is described by the use of sample statistics such as minima, maxima, and means of the variables at each station. The temporal variation is described by using nonparametric statistical testing procedures to assess time trends in the data at each station.

Evaluation of the coefficients (mean, amplitude, phase coefficient) derived by harmonic analysis of available daily stream-temperature records indicates adequate depiction of yearly seasonal variability and provides information relative to spatial variation in stream temperatures at most sites. Lowest harmonic amplitudes, which are indicative of little seasonal variability in stream temperature, were observed in Florida, along the eastern Gulf coast, and along the Pacific coast. Greatest annual variations in stream temperature exists in the Souris, Red (of the North), and Missouri River basins.

ABSTRACT

Accession Number:
@ 762
Stephens, J.C., and others, 1974, Ground-water conditions in Utah, spring of 1974: Utah Dept. of Natural Resources, Cooperative Investigations Report No. 13, 72 p.

Contact: USGS - Salt Lake City (copy)
Utah Division of Water Resources (copy)

Key Categories: GROUNDWATER QUANTITY, UTAH

Access Code: 011 Use Code: 03

This is the eleventh in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow.

The report includes individual discussions of the most important areas of groundwater withdrawals in the State for the calendar year 1973. Water-level fluctuations, however, are described for the period spring 1973 to spring 1974.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-73. Other information that encompasses the study area is combined with data from other parts of the State.

ABSTRACT

Accession Number:
@ 763
Stevens, M.D., 1978, Ground-water levels in Wyoming, 1977: U.S.
Geological Survey Open-File Report 78-605, 203 p.

Contact: Edward Cox (copy)

Key Categories: WYOMING, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

Ground-water levels are measured periodically in a network of about 290 observation wells in Wyoming to record changes in ground-water storage. The areas of water-level observation are mostly where ground water is used in large quantities for irrigation or municipal purposes. This report contains maps showing location of observation wells and water-level changes from 1977 to 1978. Well history, highest and lowest water levels, and hydrographs for most wells are also included in this report.

The program of ground-water observation is conducted by the U. S. Geological Survey in cooperation with the Wyoming State Engineer and the city of Cheyenne.

ABSTRACT

Accession Number:
@ 763.1
Stockton, C.W., and Jacoby, G.C., Jr., March 1976, Long-term surface-water supply and streamflow trends in the Upper Colorado River basin: Lake Powell Research Project Bulletin no. 18, Rep. NSFD/RA-760410, 79 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

The long-term annual runoff was reconstructed from 12 selected streamgage stations within the upper Colorado River basin. These gaged records were analyzed to determine homogeneity, streamflow trends, and periodicities, and were compared to other records within the basin. Three long-term reconstructed hydrographs for the total annual flow at the Colorado River compact point were calculated and compared. Records showed that the early part of the 20th century was one of persistent high runoff from the Colorado River basin, and the greatest and longest high-flow period within the last 450 years. When the results of the analysis are viewed in the context of future demand for water usage in the upper Colorado River basin, it is apparent that projected demand could soon outstrip the natural annual supply of surface water. This situation probably would necessitate shifts in water use priorities, with current agricultural and recreational allotments being diverted to those needed to meet energy, municipal and industrial demands.

ABSTRACT

Accession Number:
@ 764
Stollenwerk, K.G., and Runnells, D.D., 1981, Composition of leachate from surface-retorted and unretorted Colorado oil shale: in Environmental Science and Technology, v. 15, no. 11, p. 1340-1346.

Contact: Ken Stollenwerk (copy)
Denver Public Library (loan)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 01

Leachability of selected trace elements in retorted and unretorted oil shale was studied in order to determine the potential for degradation or pollution of water. Emphasis was placed on As, Se, Mo, B, and F because these elements are relatively toxic and because they may occur as soluble anions under the pH conditions (8–12) of water associated with retorted oil shale. On the basis of the samples of shale used in this study, the initial leachate that migrates from actual disposal piles of waste oil shale (depending upon the source of the shale) will probably contain the following approximate concentrations (all values in mg/L): (a) fresh oil shale—TDS, 18 000; Mo, 9; B, 32; F, 16; (b) Paraho retorted oil shale—TDS, 28 000; Mo, 3; B, 3; F, 10; (c) TOSCO II retorted oil shale— TDS, 55 000; Mo, 9; B, 18; F, 19. Solubility calculations indicate that the aqueous Mo is predicted to be present chiefly as MoO_4^{2-}, boron as $B(OH)_3^0$ and $B(OH)_4^-$, and fluorine as free F^-. Powellite ($CaMoO_4$) may control dissolved Mo, and fluorite (CaF_2) probably controls dissolved F.

ABSTRACT

Accession Number:
@ 764.1
Stollenwerk, K.G., 1980, Geochemistry of leachates from retorted and unretorted Colorado oil shale: Ph.D. dissertation, University of Colorado, Boulder, Colorado, 218 p.

Contact: University Microfilms International (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 01

This thesis presents the results of a laboratory study to evaluate the potential impacts of leachates from an oil shale industry on water quality. The study used spent shale from the TOSCO II and Paraho processes and focusses on the elements As, Se, B, Mo, and F. A geochemical model was used to predict the chemical species present in leachates. The aqueous chemistry of S in these leachates was also investigated. The resulting data were compared with data from field lysimeters to assess the reliability of laboratory simulations. The resulting experimental data were used to estimate the impact of leachates from four sites in the Piceance basin on water quality. Batch and column studies were conducted to determine the effect of equilibration time, leaching time, wet-dry cyles, and other variables on leachate composition.

ABSTRACT

Accession Number:
@ 765
Stollenwerk, K.G., and Runnells, D.D., 1977, Leachability of arsenic, selenium, molybdenum, boron, and fluoride from retorted oil shale: in Proceedings of the Second Pacific Chemical Engineering Congress, Denver, Colorado, v. II, American Institute of Chemical Engineers, New York, New York, p. 1023.

Contact: AICHE (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 01

Leachability of selected trace elements in retorted oil shale was studied in order to determine the potential for water pollution. Arsenic, selenium, molybdenum, boron, and fluoride were chosen because they may occur as soluble anions under the pH conditions (8-12) of water associated with retorted shale. Spent shale samples, from the Mahogany Zone and prepared by the TOSCO II process, were employed. The material is characterized by silt-size grains that are coated with carbon. Shaker and column experiments were designed in order to test mobility of the elements. Maximum concentrations (mg/l) in retorted shale leachates from six column experiments ranged from 11-20 (F), 8.4-14.5 (B), 8.8-11.8 (Mo), .03-.04 (As), and .02-.03 (Se). Total dissolved solids ranged from 7,300 - 14,200 mg/l and pH from 8.3-8.7. Hydraulic conductivity ranged from 1.7×10^{-5} to 3.7×10^{-4} cm/sec.

ABSTRACT

Accession Number:
@ 765.1
Stuber, H.A., and Leenher, J.A., 1978, Fractionation of organic solutes in oil shale retort waters for sorption studies on processed shale: American Chemical Society, Division of Fuel Chemistry Preprints, v. 23, no. 2, 165-174 p.

Contact: Jerry Leenheer (copy)

Key Categories: EFFLUENTS, LEACHING, SURFACE

Access Code: 011 Use Code: 02

A frequently proposed method for disposing of aqueous effluents from oil shale processing is the use of these waters for moistening processed shale. Retort waters produced with the oil are a major component of shale processing waste water. This study presents a unique organic solute characterization based on sorption of both a true in situ and a simulated in situ retort water. This characterization data is then applied to solute sorption studies on TOSCO II processed shale. An organic solute fractionation scheme (DOC fractionation analysis) based upon absorption was developed specifically for this study. Natural organic solutes in surface and groundwaters in the area of the Green River formation were characterized by DOC fractionation analysis to assess the impact of possible inputs of waste water from oil shale processing. The purpose of this report is to relate DOC fractionation analyses of retort waters to sorptive interactions with processed shale so that predictions can be made about the movement of organic solutes from processed shale to adjacent soils and waters. Experimental data are tabulated, plotted and discussed in terms of unability of DOC fractionation analysis in environmental protection in the oil shale processing industry.

ABSTRACT

Accession Number:
@ 766
Stuber, H.A., Leenheer, J.A., and Farrier, D.S., 1978, Inorganic sulfur species in waste waters from in situ oil shale processing: Journal of Environmental Sci. Health, v. A13, no. 9, p. 663-675.

Contact: Dave Farrier (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

Thiosulfate and thiocyanate were found to be important solutes in four waste waters derived from combustion type in situ processing of oil shale. Thiosulfate, thiocyanate, tetrathionate, sulfite, sulfate and total sulfur concentrations were determined, and the predominant sulfur species in all waste-water samples was thiosulfate, ranging from 420 to 2200 mg/L. Thiocyanate levels ranged from 24 to 730 mg/L. Hydrogen sulfide has been reported in gases derived from the retorting of oil shale, but sulfide was not detected in any of the waters studied. Analysis of water associated with an in situ retort one year after oil production has shown that thiocyanate can persist in ground waters remaining in retorted zones. Some similarities in the composition of wastes from the in situ retorting of oil shale and the ammoniacal liquors produced during coking of coal are noted.

ABSTRACT

Accession Number:
@ 767
Sumsion, C.T., 1979, Selected coal-related ground-water data, Wasatch Plateau-Book Cliffs area, Utah: U.S. Geological Survey Open-File Report 79-915 (also published as Utah Basic-Data Release 32), 25 p. plus 1 plate.

Contact: USGS - Salt Lake City (copy)

Key Categories: UTAH, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

This report summarizes groundwater data for the Wasatch Plateau-Book Cliffs area which borders the southern portion of the Utah oil shale basin and includes all of the operating coal mines in Utah in 1978. Waddell, Vickers, Upton, and Contratto, 1978 (Abstract No. 805) reported some groundwater data after a reconnaissance of part of the area. The purpose of this report, which was prepared in cooperation with the U.S. Bureau of Land Management, is to present a more detailed compilation of ground-water-related data that were collected and compiled during October 1976 to March 1978.

This report presents a generalized stratigraphic section and hydrologic characteristics of rocks in this area. It also tabulates records of selected wells in the region, including operator or owner, altitude of land surface, datum, depth, water-bearing geologic unit, interval tested, yield, and other information. Lithologic logs are presented for select test holes and water wells, and some well level and mine discharge data are summarized. Spring information, including location, altitude, geologic unit, yield, specific conductance and pH, are tabulated. Chemical analyses, including trace elements and major ions, are tabulated for selected test holes, water wells, springs, and mines.

ABSTRACT

Accession Number:
@ 768
Sumsion, C.T., and others, 1976, Ground-water conditions Utah, spring of 1976: Utah Dept. of Natural Resources, Cooperative-Investigations Report No. 15, 69 p.

Contact: Utah Division of Water Resources (copy)
USGS - Salt Lake City (copy)

Key Categories: UTAH, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 03

This is the thirteenth in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow.

The report includes individual discussions of selected major areas of groundwater withdrawals in the State for the calendar year 1975. Water-level fluctuations, however, are described for the period spring 1975 to spring 1976.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-75. Other information that encompasses the study area is combined with data from other parts of the State.

ABSTRACT

Accession Number:
@ 769
Sumsion, C.T., 1976, Water resources of Dinosaur National Monument, Utah and Colorado: U.S. Geological Survey Open-File Report 76-580.

Contact: Open-File Services Section (copy)

Key Categories: UTAH, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, COLORADO

Access Code: 002 Use Code: 01

The purpose of the investigation on which this report is based was to appraise the water resources of Dinosaur National Monument, Colorado and Utah. The need for information about water resources in the monument has become increasingly apparent due to expansion of facilities, the general aridity of the region, and the localized occurrence of potable water. The investigation was made by the U.S. Geological Survey, at the request of the U.S. National Park Service, during the period July 1967 to June 1970.

ABSTRACT

Accession Number:
@ 770
Sumsion, C.T., and others, 1972, Ground-water conditions in Utah, spring of 1972: Utah Dept. of Natural Resources, Cooperative-Investigations Report No. 10, 73 p.

Contact: Utah Division of Water Resources (copy)
USGS - Salt Lake City (copy)

Key Categories: UTAH, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 03

This is the ninth in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow. It also contains supplementary data that are related to groundwater use in some areas.

The report includes individual discussions of the most important areas of groundwater withdrawals in the State for the calendar year 1971. Water-level fluctuations, however, are described for the period spring 1971 to spring 1972.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-71. Other information that encompasses the study area is combined with data from other parts of the State.

ABSTRACT

Accession Number:
@ 771
Sumsion, C.T., 1971, Water-resources investigations in Dinosaur National Monument, Utah-Colorado, fiscal year 1970: U.S. Geological Survey Open-File Report, p. 52.

Contact: Open-File Services Section (copy)

Key Categories: UTAH, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SPRINGS

Access Code: 002 Use Code: 02

Water-resources data were acquired during fiscal year 1970 by the U.S. Geological Survey at Dinosaur National Monument, Utah-Colorado, for the U.S. National Park Service as part of a continuing project. The data provide a basis for planning the development, management, and use of available water resources to provide adequate water supplies. Thirty-one springs, 19 in relatively inaccessible areas, were evaluated as sources of water supplies. Seven potential well sites were evaluated for drilling depths in specific aquifers. A well drilled in Echo Park near the confluence of the Green and Yampa Rivers was tested. The pumping test showed the well to yield 130 gallons per minute with a drawdown of 1.96 feet; specific capacity of the well at 130 gallons per minute is 66 gallons per minute per foot. Water samples for chemical analysis were collected from nine springs and one well; all except that from Disappointment Spring were of good chemical quality.

ABSTRACT

Accession Number:
@ 772
Sumsion, C.T., and others, 1970, Ground-water conditions in Utah, spring of 1970: Utah Dept. of Natural Resources, Cooperative-Investigations Report No. 8, 71 p.

Contact: Utah Division of Water Resources (copy)
USGS - Salt Lake City (loan)

Key Categories: GROUNDWATER QUANTITY, UTAH

Access Code: 112 Use Code: 03

This is the seventh in a series of annual reports that describe groundwater conditions in Utah. Reports in the series are prepared cooperatively by the U.S. Geological Survey and the Utah Division of Water Resources.

This report contains information on well construction, groundwater withdrawals, water-level changes, and related changes in precipitation and streamflow. It also contains supplementary data that are related to groundwater use in some areas.

The report includes individual discussions of the most important areas of groundwater withdrawals in the State for the calendar year 1969. Water-level fluctuations, however, are described for the period spring 1969 to spring 1970.

This report contains very little information specific to the Utah oil shale basin. It presents two hydrographs that show the relation of well water levels to cumulative departures from the average annual precipitation for the period 1935-69. Other information that encompasses the study area is combined with data from other parts of the State.

ABSTRACT

Accession Number:
@ 772.1
Sung, R.D., Cotter, J., Neal, L.G., and Prien, C.H., 1977,
Evaluation of the pollution abatement technologies available for treatment of wastewater from oil shale processing: in AIChE Symposium Series, v. 73, no. 166, 323-332 p.

Contact: AIChE (copy)

Key Categories: SURFACE, IN-SITU, EFFLUENTS

Access Code: 002 Use Code: 03

A summary is presented of portions of an on-going study to evaluate and assess all environmentally acceptable waste water control technologies for mining and processing of oil shale. The study includes extensive review of pertinent literature on pollution control and collection of performance data from governmental agencies, manufacturers, and operators. Where data gaps exist, laboratory and/or field testings are conducted to generate needed data.

ABSTRACT

Accession Number:
@ 772.2
Systems Consultants, Inc., Dec. 1981, Energy and solid hazardous waste: U.S. Dept. of Energy Rep. DOE/EP/10154-2, 233 p.

Contact: George Rotariu (copy)

Key Categories: SURFACE, IN-SITU, LEACHING

Access Code: 011 Use Code: 02

This book addresses the past and potential future solid and hazardous waste impacts from energy development and summarizes the major environmental legislation applicable to solid/hazardous waste generation and disposal. Coal combustion, gasification and liquefaction, and oil shale are emphasized, although other energy technologies are considered. Some of the major topics related to solid/hazardous waste management are reviewed (siting, nuclear waste management, radioactivity in coal, coal combustion in highly urbanized areas). The types of solid waste generated by various types of energy facilities, pertinent regulations, types of disposal sites, and solid waste utilization are described. A data section tabulates information on the chemical composition of solid wastes from energy processes, current levels of solid waste generation, effects and methods of solid waste disposal, disposal sites, and waste utilization.

ABSTRACT

Accession Number:
@ 772.3
Systems Consultants, Inc., Dec. 1981, Energy and water resources:
U.S. Dept. of Energy Rep. DOE/EV/10154-4, 322 p.

Contact: George Rotariu (copy)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN, PROCESS WATER USE, WATER LAW, ENVIRONMENTAL, EFFLUENTS, SURFACE, IN-SITU

Access Code: 011 Use Code: 01

This book presents data and other information on the relationship between water and energy development. It draws together some of the physical and institutional data required to identify and understand water issues which rise in regard to the various aspects of energy development.

Three basic water-energy areas are considered: water quality, water supply, and institutional framework. The report overviews a number of generic issues relevant to water supply and water competition (interbasin and interstate transfers, conservation, increased use of groundwater and other alternative supplies) and water quality (restrictions in poor or high quality areas, zero discharge, mine drainage, acid rain, groundwater contamination, drinking water supply protection). A section of Data Description presents a qualitative discussion of water availability, use, pollutant levels, and institutional frameworks and specifically addresses the water use and pollutant loadings associated with energy production (steam electric generation, hydroelectric power generation, geothermal energy, synthetic fuels, coal slurry pipelines, solar energy, oil refining, oil and natural gas extraction, coal and uranium extraction). A final section on Water Resources Data tabulates a large quantity of data on water availability, water use, water quality laws, water supply laws, ambient pollutant levels, energy-related residuals and loadings, effects of energy-related pollutants, and mitigation procedures.

ABSTRACT

Accession Number:
@ 772.4
Tait, D.B., Oct. 1972, Geohydrology of the Piceance Creek basin, Colorado: 47th American Institute of Mining, Metallurgical and Petroleum Engineers., annual fall meeting, San Antonio, Texas, Paper SPE 4046, Preprint.

Contact: Dan Tait (copy)

Key Categories: GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 03

Potential need for water for developing an oil shale industry prompted a study in which temperature logging equipment was developed and logs run in as many uncased oil test holes as could be found open. The resulting data show a subsurface flow of water from southeast to northwest across the Piceance Creek basin.

ABSTRACT

Accession Number:
@ 773
Tarlock, A.D., Winter 1975, Recent developments in the recognition of instream uses in Western water law: Utah Law Review, v. 1975, n. 4, p. 871-903.

Contact:

Key Categories: COLORADO, UTAH, WYOMING, WATER LAW

Access Code: 002 Use Code: 03

Prior appropriation is theoretically inconsistent with public rights to instream waters. To resolve this dilemma, Western Water Law developed the theory that the state held water rights in public trust. State protection of minimum flows is necessary since private uses have little incentive to appropriate water for instream uses when more profitable uses are available. State constitutions and codes in western states require actual diversion, an intent to appropriate, and application to a beneficial use. However, recent cases have abrogated the actual diversion requirement by allowing natural diversions and later, instream appropriation. The barrier of beneficial use must still be overcome. Traditionally, instream uses have been less desirable, requiring large amounts of water and yielding little monetary return. One remedy is broad definition of beneficial use to include public interest in the quality of the environment. Alternatively, instream use can be protected by allowing appropriation permit denial on grounds recognizing public interest. Recent state environmental legislation often cites the impact on flow maintenance as a factor to be weighted in judging water rights applications. The federal geovernment, possessing superior rights to water reservation, can complement state minimum flow programs by requiring minimum flows in any navigable river.

ABSTRACT

Accession Number:
@ 773.1
Taylor, O.J., and others, 1982, Hydrology information requirements for oil shale development, Northwestern Colorado: [in preparation 1982].

Contact: Jim Taylor (status)

Key Categories: COLORADO, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, MODELS, PROCESS WATER USE, AVAILABLE WATER BY BASIN, LEACHING, SURFACE

Access Code: 002 Use Code: 01

This report consists of a series of technical articles which overviews the present state of knowledge in several water-related areas relevant to oil shale development in Colorado and which proposes future hydrologic investigations to resolve uncertainties. The topics covered in this report include: water requirements and availability for oil shale development; test drilling and logging for water exploration; aquifer testing; determination of water quality in local surface and ground waters; spring inventory and analyses; surface water modelling; water quality assessment of White River Basin; acid rain; spoil pile geochemistry and hydrology; and oil shale process wastes with a focus on the MIS process.

ABSTRACT

Accession Number:
@ 773.2
Taylor, O.J., 1982, Three-dimensional model for simulating the hydrologic system in the Piceance Basin, Colorado: U.S. Geological Survey Water-Resources Investigations Open-File Report 82-637.

Contact: Jim Taylor (copy)

Key Categories: COLORADO, COMPUTER MODELS, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

The Piceance basin extends over an area of about 1,600 square miles in northwestern Colorado and includes the drainage basins of Piceance, Yellow, Roan, and Parachute Creeks. Beneath the drainage basins lie the Uinta and Green River Formations of Eocene age and older rocks. The Uinta and Green River Formations consist of marlstone, sandstone, and siltstone and include large reserves of oil shale. Extensive fracturing and leaching of the formations has increased their permeability and resulted in aquifers that lie within, above, and below the oil-shale deposits.

The hydrologic system of the basin consists of natural recharge from precipitation, circulation through fractured aquifers and confining beds, and discharge to stream valleys or seepage faces. Previous models were utilized to simulate the flow systems in the northern part of the Piceance basin. A preliminary three-dimensional, five-layer simulation model was prepared for the entire basin using available hydrologic data. The model was used in a steady-state error analysis to assess the degree of error in the hydrologic parameters used in the model. This analysis indicated that simulated hydrologic characteristics are plausible, all layers exhibit impaired vertical hydraulic conductivity, and one layer may exhibit lateral directional transmissivity. However, the model could not be calibrated because of the paucity of data in some regions of the basin.

ABSTRACT

Accession Number:
@ 773.3
Taylor, O.J., compiler, 1982, Oil Shale, a mineral wealth, water-resource challenges and development choices: Piceance Basin, Colorado: U.S. Geological Survey Professional Paper (in review 1982)

Contact: Jim Taylor (status)

Key Categories: COLORADO, SURFACE, RECLAMATION, LEACHING, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, WATER LAW

Access Code: 002

Use Code: 01

This report, intended as a general information document for the lay public and technical reader, consists of a number of technical review articles that cover every aspect of oil shale development, from mining and processing to product transportation and end use. Individual articles are included on water law, mining and retorting, reclamation, geology, water quality, environmental issues, and many other topics. Many references, including recommended readings, are included.

ABSTRACT

Accession Number:
@ 774
Thatcher, L.M., Feb. 1973, Utah's groundwater quality information system: in Proceedings of Conference on Toward a Statewide Groundwater Quality Information System and report of Groundwater Quality Subcommittee, Citizens Advisory Committee, Governors Environmental Quality Council, University of Minnesota Water Resources Research Center, p. 181-190.

Contact:

Key Categories: UTAH, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

In Utah, environmental quality matters are within the Division of Health, with policy guidance of three statutory bodies: the State Board of Health, State Air Conservation Committee, and State Water Pollution Committee. Computerized inventories of water pollution sources and similar inventories of municipal water supplies are in use. Present procedure also includes publishing annually all chemical and radiological laboratory analysis information in chronological tabulation. Bacteriological analyses performed primarily on some 335 municipal supplies, and not identified as to source, are tabulated for each municipality on an annual basis to determine compliance with drinking water standards. A few separate groundwater sources may be monitored for coliforms.

ABSTRACT

Accession Number:
@ 774.1
Theurer, F.D., 1982, Instream water temperature model: Instream Flow Information Paper 16, Cooperative Instream Flow Service Group, U.S. Fish and Wildlife Service, Fort Collins, CO.

Contact: Instream Flow and Aquatic Systems Group (copy)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS, SURFACE WATER QUALITY

Access Code: 011 Use Code: 01

This report provides complete documentation and solution techniques for the instream water temperature model developed by the Cooperative Instream Flow Service Group of the U.S. Fish and Wildlife Service.

The instream water temperature model is designed for general application, but does not currently include a reservoir or lake feature. It uses standard hydrology and hydraulic data and a few readily available meteorological parameters. Mean daily (24-hour average), minimum night-time, and maximum daytime water temperatures are predicted for the time periods represented by the meteorological and hydrological input data.

The instream water temperature model has two principal water temperature prediction portions -- a regression model and the physical-process model. The regression model uses the same physical parameters as the physical-process model. Its purpose is to aid in obtaining headwater water temperatures for determining initial conditions and interior water temperatures for validation and calibration. The physical-process model has five components: (1) a solar model that predicts the solar radiation penetrating a water surface; (2) a meteorology transfer model that transfers meteorological data from a weather station to any point in the basin; (3) an equilibrium water temperature model using state-of-the-art heat flux components; (4) a dynamic temperature-steady flow heat transport model; and (5) calibration procedures for certain physical parameters when water temperature data are available at interior points.

ABSTRACT

Accession Number:
@ 774.2
Theurer, F.D., and Voos, K.A., 1981, IFG's instream water temperature model validation: Cooperative Instream Flor Service Group, U.S. Fish and Wildlife Service, Fort Collins, CO 6 p.

Contact: Instream Flow and Aquatic Systems Group (copy)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS, SURFACE WATER QUALITY

Access Code: 011 Use Code: 01

An instream water temperature model has been developed, verified, validated, and applied by the Cooperative Instream Flow Service Group (IFG) (Theurer, 1982). Various solution techniques have been constructed ranging from desktop calculator programs designed for simple applications to a sophisticated computer program designed for complex or large data volumes or repetitive applications. This paper discusses validation results for one application. Complete documentation for the model and solution techniques is available from IFG.

ABSTRACT

Accession Number:
@ 775
Thill, R.E., July 1980, Twin Cities Research Center oil shale data bank update: Distributed at Bureau of Mines Oil Shale Research Open Briefing, July 25, 1980, Denver, Colorado.

Contact: Don West (copy)

Key Categories: BIBLIOGRAPHY

Access Code: 011 Use Code: 01

This paper is a description of and information guide to the computerized oil shale data bank that was created by the Bureau of Mines at its Twin Cities Mining Research Center. The purpose of this data bank is to collect and evaluate literature and technical information pertinent to mining of oil shale and to provide a means for retrieval of stored information. The data bank includes five types of information: (1) bibliographic references, (2) patents, (3) current research projects, (4) property data, and (5) data syntheses and analyses. This paper includes sample printouts from the first three sections.

This data base is presently not operable (January 1982). The information has been transferred to punch cards but is not accessible by computer and no listings of the information are available. It is expected to be operable in 1982 if funding continues.

ABSTRACT

Accession Number:
@ 776
Thomas, H.E., 1952, Hydrologic reconnaissance of the Green River in Utah and Colorado: U.S. Geological Survey Circular 129.

Contact: USGS Library (loan)

Key Categories: UTAH, WYOMING, COLORADO, SURFACE WATER QUANTITY, SURFACE WATER QUALITY

Access Code: 182 Use Code: 02

The Green River, rising in Wyoming and draining high mountains in that state, northeast Utah and northwest Colorado, is a major tributary of the Colorado River. In the late summer, after the snow has melted from these mountans, the flow in the Green River reaches its minimum for the year. At that time a large proportion of the water in the river is returned to the atmosphere by evaporation and transpiration.

During a 21-day period in September 1948, when the flow was least for the year, the average flow of the river as it entered Utah from Wyoming was 515 cfs. In the 437 miles of its course through Utah and Colorado evapotranspiration losses averaged 430 cfs. The average discharge of the Green River into the Colorado was about 975 cfs. Contributions to the river in Utah and Colorado totalled 890 cfs, including 560 from tributaries. The calculated groundwater inflow was about 330 cfs, of which about 75 percent was contributed within the Uinta basin. Very little groundwater was contributed to the river in the lower 180 miles of its course, where the river flows through canyon lands of the Colorado Plateaus.

These estimates are based upon information collected during the boat reconnaissance in September 1948, and upon data available from stream-gaging stations along the Green River and many of its tributaries. From these data an account was made of the water--as to both quantity and quality--in several segments of the river. For each segment determiniations were made of the surface outflow, loss by evapotranspiration, and surface- and groundwater inflow. During the reconnaissance information was also obtained as to the relation of stream flow to regional geology and groundwater hydrology.

ABSTRACT

Accession Number:
@ 777
Thomas, H.E., and Wilson, M.T., 1952, Determination of total evapotranspiration in Ashley Valley, Utah, by the inflow-outflow method: U.S. Geological Survey Open-File Report, 15 p.

Contact: Open-File Services Section (copy)

Key Categories: CLIMATE, UTAH, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 03

This report uses the inflow-outflow method (i.e., water balance) to determine evapotranspiration in Ashley Valley, Utah. The report discusses the method used, and it discusses and evaluates each element in the computation. The effects of irrigation, evapotranspiration, and precipitation on changes in well levels is discussed. Groundwater levels are correlated with surface inflow and stream-flow depletions. Total evapotranspiration is determined during period beginning and ending with equivalent storage and during periods including the growing seasons of 1949 and 1950. Monthly evapotranspiration estimates are presented and inferences as to evapotranspiration during other years are presented.

ABSTRACT

Accession Number:
@ 778
Thomas, H.E., 1953, Reconnaissance studies of the Green River: Sci. Monthly, v. 77, no. 2, p. 95.

Contact: Denver Public Library (loan)

Key Categories: UTAH, SURFACE WATER QUALITY, SURFACE WATER QUANTITY GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 182 Use Code: 03

In this article, the author summarizes his findings from "Hydrologic Reconnaissance of the Green River in Utah and Colorado," U.S. Geological Survey Circular 129. (See Accession No. 776.)

ABSTRACT

Accession Number:
@ 779
Thomsen, A.G., and Striffler, W.D., Sept. 1980, A watershed information system: Colorado Water Resources Research Institute, Colorado State University Completion report 100, 97 p.

Contact: NTIS (copy)

Key Categories: COLORADO, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 02

A watershed information system for the analysis and simulation of mountain watersheds is described. Watershed information on topography, vegetation and soils in digital terrain models (overlays) serve as the data base for watershed analysis, classification of snow in Landsat imagery and automatic generation of parameter decks for operating distributed simulation models of snowcover dynamics and streamflow generation. The computer programs that generate the parameter decks have built-in calibration from any interactive computer terminal, on watersheds with varying characteristics. Options are available for simulating the effects of forest management alternatives (thinning, clearcutting) on selected forest stands. Snow course measurements and Landsat imagery are used for simulation update. Examples of output from subsystems are included to illustrate the capabilities of the information system.

ABSTRACT

Accession Number:
@ 780
Thorne Ecological Institute, May 1973, An environmental reconnaissance of the Piceance basin, Rio Blanco and Garfield Counties, Colorado: environmental inventory, analysis and impact study portion of the Regional Oil Shale Study.

Contact: BLM - Craig (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 102 Use Code: 02

This report represents the completion of Part I Phase One, the Environmental Inventory, Analysis and Impact Study by Thorne Ecological Institute.

The purpose of Part I Phase One is to assemble presently available information with applicable literature references in each of the environmental components, and to complete a field reconnaissance. The report includes available information, the results of the reconnaissance and the literature on thirteen environmental components, as follows: Recreation Resources, Scenic Resources, Terrestrial Vertebrate Fauna, Plant Ecology, Soils, History and Anthropology, Surficial Geology, Climatology, Disease Vectors, Surface runoff & snow, Cold-blooded Vertebrates, and Water quality. The study area is in the Piceanse Basin and its surrounding stream corridors.

ABSTRACT

Accession Number:
@ 781
Tipton and Kalmbach, Inc., July 1978, C-b tract supplement to the report entitled, hydrology, mine dewatering, and water use and augmentation, dated August 1977 with particular reference to steam flow augmentation: Denver Colorado, 14 p. + tables and figures.

Contact: Area Oil Shale Supervisor's Office (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, PROCESS WATER USE, IN-SITU

Access Code: 011 Use Code: 02

This report expands upon the issues of stream flow augmentation in connection with site dewatering at tract C-b. Additional information on this topic is presented in Tipton and Kalmbach, Aug. 1977. The concern addressed in these reports is the effect of dewatering operations at tract C-b on flow in the Piceance Creek. There has been (and remains) considerable controversy over the hydraulic connection of the aquifer system and Piceance Creek.

The present report discusses the composition of streamflow along Piceance Creek (baseflow and runoff), the effect of dewatering on stream flow, natural variations in base flow, and flow conditions that were present prior to the May 1973 Rio Blanco underground nuclear blast.

ABSTRACT

Accession Number:
@ 781.1
Tipton and Kalmbach, Inc., Aug. 1977, C-b tract, Piceance Creek basin, Rio Blanco County, Colorado, hydrology, mine dewatering and water use and augmentation: Denver, Colorado, 49 p. plus tables and figures.

Contact: Area Oil Shale Supervisor's Office (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, PROCESS WATER USE, IN-SITU

Access Code: 011 Use Code: 02

This report evaluates the effects of in situ mine dewatering on local water supplies and identifies and evaluates methods to mitigate these impacts. It also presents a preliminary water management plan. The report evaluates the hydrology of the tract C-b area, estimates the amount of water that will have to be pumped to dewater the mine and the amount and quality of water to be disposed of, and it evaluates the effect of such operations on vested water rights. The various kinds of works that may be required to implement the water management plan are described conceptually. Potential areas of excess mine water are described.

ABSTRACT

Accession Number:
@ 782
Tipton and Kalmbach, Inc., 1972, Engineering report on the development of presently unused water supplies of the Green River basin in Wyoming: Part I. Report (105 p.) and Part II. Appendices, State of Wyoming, Department of Economic Planning and Development Report.

Contact: USBR - Salt Lake City Library (loan)

Key Categories: WYOMING, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 002 Use Code: 02

This is a comprehensive feasibility study on alternative storage projects located downstream from Fontenelle Reservoir in the Green River Basin. This report assesses the technical, economic, financial, social and environmental feasibility of such a storage project. It provides a comprehensive review of previous studies and available data related to water supplies and water use. It also presents estimates of the amount of water available for future development, of potential future water requirements for agriculture, municipal, industrial and other uses, and of reservoir storage capacity to maximize the use of Green River supplies within the State of Wyoming. Preliminary designs and plans are presented for the necessary storage facilities and corollary works. The appendices present backup information and studies on hydrology, geology, cost estimates, and the effect of the Lower Green Reservoir on the trona industry. The hydrology section discusses stream flow and precipitation, consumptive use and reservoir evaporation, reservoir operation studies, and flood hydrology.

ABSTRACT

Accession Number:
@ 782.1
Tipton and Kalmbach, Inc., July 1965, Water supplies of the Colorado River: report prepared for Colorado Water Conservation Board, Denver, Colorado.

Contact: Colorado Water Conservation Board (copy)

Key Categories: COLORADO, WYOMING, UTAH, AVAILABLE WATER BY BASIN

Access Code: 011 Use Code: 02

This report presents the results of a study of the water supplies available from the Colorado River for use in the Lower Colorado River Basin and to determine whether such supplies would be available at all times to satisfy uses by the states of Arizona, California and Nevada.

The report consists of two parts: Volume I - Text, and Volume II - Appendices. The text describes the manner in which the studies were made and gives the results of the most pertinent studies and final conclusions based on those results, and the reasons therefor. The Appendices consist of copies of all the detailed river and reservoir operation studies that were considered directly pertinent to the report. The Appendices also contain tables indicating the estimated present depletions on the river by the States of the Upper Division of the Colorado River Basin, and the prognostication by projects of increased depletion in the future, as made by various entities. A master table is included which indicates all known potentials in the Upper Basin and estimates of others which might come into being.

ABSTRACT

Accession Number:
@ 782.2
Tobin, R.L. 1981, Hydraulic research of springs, Piceance Creek and Yellow Creek drainage basin: in Water-resources investigations of the U.S. Geological Survey in Coloado - fiscal year 1981, U.S. Geological Survey Open-File Report 81-150,93.

Contact: Bob Tobin (status)

Key Categories: COLORADO, SPRINGS

Access Code: 000 Use Code: 01

ABSTRACT

Accession Number:
@ 782.3
Tobin, R.L., 1981, Geochemical investigation, Piceance Creek and Yellow Creek drainage basins: in Water-resources investigations of the U.S. Geological Survey in Colorado - fiscal year 1981, U.S. Geological Survey Open-File Report 81-150, p. 96.

Contact: Bob Tobin (status)

Key Categories: COLORADO, SPRINGS, GROUNDWATER QUALITY, COMPUTER MODELS

Access Code: 011 Use Code: 01

The purpose of this program is to determine the present ground water quality in the Piceance and Yellow Creek drainages and to develop a solute-transport computer model. The preliminary results of solute-transport modeling have been reported by Robson and Saulnier, 1981. Basic data collection has been completed and a data report is in preparation. Future work will include collection of water quality samples during planned aquifer tests and a review and extension of well and spring quality data.

ABSTRACT

Accession Number:
@ 732.4
Topil, A.G., May 1971, Summer shower probability in Colorado as related to altitude: National Oceanic and Atmospheric Administration Technical Memorandum NWS CR-43, 5 p.

Contact: National Climatic Center (copy)

Key Categories: COLORADO, CLIMATE

Access Code: 002 Use Code: 03

Records from 1959 to 1968 were used to determine rain-shower probability in Colorado as related to altitude. The study was limited to the months of July and August, as almost all precipitation during those months falls as showers. The climatological data for Colorado was used in finding the average number of days with precipitation (0.01 inch or more) at 193 stations. Twenty-four hour probabilities were used. There is an increase in precipitation probability with altitude in Colorado averaging nearly 5 percent per thousand feet during July and August. There is also a variation of precipitation probability east and west of the continental divide, with the eastern stations averaging about 5% higher probability at all elevations. Also, western areas show an increase of shower activity in August as compared with July, whereas eastern drainage basins generally show a decrease in precipitation probability from July into August.

ABSTRACT

Accession Number:
@ 783
Torpy, M.F., and Raphaelian, L.A., 1981, Characterization and treatment of oil shale retort water: Argonne National Laboratory Report, 11 p.

Contact: Mike Torpy (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

This paper summarizes the results of a research program of Argonne National Laboratory to reduce the organic constituents in retort waters by chemical, physical, and biological methods. The investigations were conducted on a sample of Occidental in situ retort water.

The report reviews research on the biological treatment of retort waters. Organic and inorganic characterization data are presented on the in situ retort water used in the Argonne studies. The results of research in which raw retort water is pretreated by ammonia stripping, ozonation, pH adjustment, phosphate supplements and various combinations of activated sludge and activated sludge to which powdered activated carbon has been added are summarized.

ABSTRACT

Accession Number:
@ 783.1
Tosco Development Corp., Oct. 1981, Project description technical report, sand wash shale oil project, Uintah County, Utah: for Bureau of Reclamation.

Contact: Special Projects Office (loan)

Key Categories: SURFACE, PROCESS WATER USE, EFFLUENT, RECLAMATION

Access Code: 070 Use Code: 01

ABSTRACT

Accession Number:
@ 784
TRW, 1982, NOSR 1 hydrologic data book: report prepared by TRW Energy Systems Planning Division for DOE.

Contact: John McCord (status)

Key Categories: COLORADO, CLIMATE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, SPRINGS, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 01

This book contains all of the basic data collected under the baseline monitoring program on the Naval Oil Shale Reserve No. 1. Tabulations and graphs of surface water discharge and quality and meteorological data will be included together with information on aquifer testing, groundwater quality, spring surveys and water quality analyses, and calculations of aquifer properties.

The book is being printed and distributed in a limited edition. Copies will be available for inspection in the Area Oil Shale Supervisor's Office, Grand Junction; Water Resources Division, U.S. Geological Survey, Grand Junction and Meeker; and Bureau of Land Management, Glenwood Springs.

ABSTRACT

Accession Number:
@ 784.1
TRW, Inc., 1982, Hydrologic characterization of NOSR 1: Report prepared by TRW Energy Systems Planning Division for Dept. of Energy.

Contact: John McCord (status)

Key Categories: COLORADO, CLIMATE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, SPRINGS, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

This Hydrologic Characterization report for the Naval Oil Shale Reserve No. 1 (NOSR 1) summarizes and analyzes information obtained during the multi-year predevelopment program conducted by TRW, Inc. for the U.S. Department of Energy. The compilation and analyses of this data define the baseline hydrologic conditions and provide important hydrologic information for input into development planning.

The characterization of the hydrologic system on NOSR 1 is based on several years of data on precipitation, surface water, and groundwater. Precipitation data was collected at three precipitation gages and from an extensive snow reconnaissance network. Data on surface water quantity and quality was collected at five gaging sites and from over 80 springs. Groundwater aquifer test data and water samples obtained at 10 core-holes were used to define the hydraulic and chemical characteristics of each of the four identified water-bearing zones. All basic data are published separately in the NOSR 1 Hydrology Data Book (TRW, March 1982). This report summarizes that data and provides an integrated picture of the hydrologic system on NOSR 1.

ABSTRACT

Accession Number:
@ 784.2
TRW, Nov. 1981, NOSR 1 air quality and metorological monitoring, 1981 interim data report: report prepared by TRW Energy Engineering Division, McLean, VA for DOE, 21 p.

Contact: John McCord (loan)

Key Categories: COLORADO, CLIMATE

Access Code: 002 Use Code: 02

This report summarizes the results of an air quality and meteorological monitoring program on the Naval Oil Shale Reserve No. 1 (NOSR) to provide baseline data. Ambient air quality monitoring, conducted from June 25 to September 22, 1980 and from June 25 to September 20, 1981, includes suspended particulates, sulfur dioxide, ozone, and trace elements. Meteorological analyses include wind speed and direction at 10-, 25-, and 50-meters, temperature at 10- and 50 meters, relative humidity, and rainfall.

ABSTRACT

Accession Number:
@ 784.3
TRW, Nov. 1981, Water system study for NOSR 1: report prepared by TRW Energy Engineering Division, McLean, VA, for DOE.

Contact: John McCord (loan)

Key Categories: SURFACE, PROCESS WATER USE, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 02

This report estimates process water requirements for the Lurgi-Ruhrgas, TOSCO II, Superior, Paraho, and Union B processes in barrels of water per barrel of oil and uses these estimates to estimate total water needs for a 50,000 and 200,000 barrels of oil per day (BPD) oil shale facility on the NOSR 1. Water requirements for urban uses associated with this development are also estimated. The availability of water for these uses is explored. Six water supply alternatives are developed, and environmental constraints and comparative costs are overviewed. Appendices present analyses of periods of nonwithdrawal of water from the Colorado River, environmental considerations of emergency storage reservoir site ranking and a discussion of emergency water supply from federal reservoirs.

ABSTRACT

Accession Number:
@ 784.4
TRW, July 1981, Wastewater treatment study, MIS retorts: report prepared by TRW Energy Engineering Division, McLean, VA, for DOE, 34 p

Contact: John McCord (loan)

Key Categories: IN-SITU, EFFLUENTS, PROCESS WATER USE

Access Code: 002 Use Code: 02

This study was undertaken to determine the efficiency of using dirty retort condensates to generate steam, evaluate technologies available for wastewater cleanup, and estimate costs associated with this cleanup. The retort waters would be treated to product a 100-psig steam with 100 to 150°F superheat for use in the retorts, and a medium- to high-pressure steam to generate power using steam turbines. The superheat is necessary to compensate for temperature losses in the lines as steam is transported from the boilers to the retort clusters. Only saturated steam is injected into the retorts. The basic scheme for the treatment of these wastewaters was to consider a minimum treatment to produce the steam quality required, and to use commercially available equipment.

This report evaluates the water quality of MIS retort condensates and identifies the equipment options available for removing impurities from these waters in order to generate steam. Four processing schemes designed to produce varying steam qualities using the wastewarer are presented. Capital and operating costs are estimated, and a determination of the added impact of wastewater treatment on the total cost of producing oil is included.

ABSTRACT

Accession Number:
@ 784.5
TRW, June 1981, NOSR 1 air quality and meteorological monitoring, 1980 data report: report prepared by TRW Energy Engineering Division, McLean, VA, for DOE, 21 p.

Contact: John McCord (loan)

Key Categories: COLORADO, CLIMATE

Access Code: 002 Use Code: 02

This report summarizes the results of the first year of an air quality and meteorological monitoring program on the Naval Oil Shale Reserve No. 1 (NOSR). Ambient air quality analyses include suspended particulates, sulfur dioxide, ozone, and trace elements, and meteorological analyses include wind speed and direction at 10-, 25-, and 50-meters, temperature at 10- and 50-meters, relative humidity, and rainfall. The report also describes the methodology used for collection of data and describes work to be conducted through May 1, 1982.

ABSTRACT

Accession Number:
@ 784.6
TRW Inc., Feb. 1981, Environmental data base references in support of the Naval oil shale reserves predevelopment program: Energy Engineering Division, McLean, Virginia, draft.

Contact: none

Key Categories: BIBLIOGRAPHY

Access Code: 011 Use Code: 02

This document is an annotated bibliography of reference material to be used in support of the Naval Oil Shale Reserves Predevelopment Program. It consists of highly selective, limited information concerning the Naval Oil Shale Reserves, surrounding areas, and the Piceance basin to support preliminary data gathering and analysis. The references are organized into nine categories which include physical environment, natural environment, and environmental data/requirements. Information found in this listing is stored on an information-retrieval system which will allow manipulation of the data and periodic expansion of the listing to include new data.

ABSTRACT

Accession Number:
@ 784.7
TRW, Feb. 1981, Conceptual process designs, Union B, Paraho, and TOSCO II, interim report: report prepared by TRW Energy Engineering Division, McLean, VA, for DOE.

Contact: John McCord (loan)

Key Categories: SURFACE, PROCESS WATER USE, EFFLUENTS

Access Code: 002 Use Code: 02

This analysis focuses on performing detailed heat and material balances around all units (retorting, gas treatment, oil upgrading, wastewater treatment, etc.) optimizing the unit operations for energy and water through proper process selection; obtaining, where possible, licensor information on the various units; defining environmental emissions from the plants; and preparing process flow diagrams, equipment lists, and detailed cost estimates in preparation for ranking and screening the process options.

ABSTRACT

Accession Number:
@ 784.8
TRW, Oct. 1980, Effects of water rights on availability, exploratory study for several NOSR production options: report prepared by TRW Energy Systems Planning Division, McLean, VA, for DOE, 18 p. plus 1 appendix and 1 map.

Contact: John McCord (loan)

Key Categories: COLORADO, AVAILABLE WATER BY BASIN, WATER RIGHT

Access Code: 002 Use Code: 01

This study defines the bounds of Colorado River water availability for both 50 and 200 thousand BPD shale oil production systems on the Naval Oil Shale Reserves No. 1 (NOSR 1), near Rifle, Colorado. By postulating senior water rights dating back to 1917 and junior water rights dated 1980, the limits of water rights effects on a continuous water supply requirement are determined. In addition, by predicting the number of continuous months during which water withdrawal is not allowed, an estimate can be made of reservoir size.

The study results show that even for senior water rights (1917), there would be seven water outage periods of one- and two-month durations during the 20-year interval. For the junior water rights case, in almost every year, there are water outage periods of up to four months' duration. The longest water outage period determines the reservoir size required to fill the water supply gap. The study indicates that the necessary-size reservoir can be filled between water outage periods even while water is being supplied to the oil shale plant. These results also appear to be valid for any oil shale facility up to 200,000 barrels per day.

ABSTRACT

Accession Number:
@ 784.9
TRW, Inc., Sept. 1980, Current environmental, health, and
socioeconomic research activities related to oil shale: draft,
Rep. DOE/RA/50211-T1, 37 p.

Contact: NTIS (copy)

Key Categories: BIBLIOGRAPHY

Access Code: 002 Use Code: 03

This document was prepared for DOE Resource Applications. It provides a compilation of information on current environmental, health, safety and socioeconomic research activities related to oil shale. The information is the most recent available through August 29, 1980. Included are the following: (1) project title; (2) administering agency; (3) contractor; (4) project status; (5) funding level; (6) project schedule; (7) deliverable; and (8) key personnel. The data contained in these reports can be used in environmental impact analyses relating oil shale to various incentives given in the Alternative Fuels Bill. The information provided was obtained from computer search printouts, review of respective agency documents and communication with agency personnel. A complete list of references is provided. The sponsoring organizations include the Department of Energy, the Environmental Protection Agency, the Department of Agriculture, and the Department of Interior.

ABSTRACT

Accession Number:
@ 784.10
TRW, Sept. 1980, Wastewater treatment study, MIS retorts, interim report: report prepared by TRW Energy Systems Planning Division, McLean, VA, for DOE, 22 p.

Contact: John McCord (loan)

Key Categories: IN-SITU, EFFLUENTS

Access Code: 002 Use Code: 02

This study was undertaken to determine the efficacy of using dirty retort condensates to generate steam, evaluate technologies available for wastewater cleanup, and estimate costs associated with this cleanup. The retort waters would be treated to product a 100-psig steam with 100 to 150°F superheat for use in the retorts, and a medium- to high-pressure steam to generate power using steam turbines. The superheat is necessary to compensate for temperature losses in the lines as steam is transported from the boilers to the retort clusters. Only saturated steam is injected into the retorts. The basic scheme for the treatment of these wastewaters was to consider a minimum treatment to produce the steam quality required, and to use commercially available equipment.

This study evaluates the use of dirty retort condensates to generate steam, evaluates technologies available for wastewater cleanup, and estimates cost associated with this cleanup. This interim report has evaluated the water quality of the retort condensates, identified the equipment options available for removing impurities from these waters, and designed four processing schemes to produce the required steam quality.

ABSTRACT

Accession Number:
@ 784.11
TRW, Sept. 1980, Conceptual process designs; Lurgi-Ruhrgas and Superior Circular Grate, interim report: report prepared by TRW Energy Systems Planning Division, McLean, VA, for DOE.

Contact: John McCord (loan)

Key Categories: SURFACE, PROCESS WATER USE, EFFLUENTS

Access Code: 002 Use Code: 02

This analysis focuses on performing detailed heat and material balances around all units (retorting, gas treatment, oil upgrading, wastewater treatment, etc.) optimizing the unit operations for energy and water through proper process selection; obtaining, where possible, licensor information on the various units; defining environmental emissions from the plants; and preparing process flow diagrams, equipment lists, and detailed cost estimates in preparation for ranking and screening the process options.

ABSTRACT

Accession Number:
@ 784.12
TRW, Sept. 1980, Interim hydrology report for NOSR 1: report prepared
by TRW Energy Systems Planning Division for DOE.

Contact: John McCord (loan)

Key Categories: COLORADO, CLIMATE, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, SPRINGS, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 02

This report summarizes available geologic and hydrologic data on the NOSR 1. The report includes surface water and precipitation data gathered by the USGS, groundwater information from coreholes 1, and geological and groundwater data from a variety of sources throughout the Piceance Basin.

The report presents hydrographs for water years 1977 and 1978 for five stations (East Middle Fork Parachute Creek, East Fork Parachute Creek near Rulison, East Fork Parachute Creek near Anvil Points, Northwater Creek near Anvil Points, and Ben Good Creek near Rulison). Storm hydrographs and mass rain fall curves are presented for several stations, and specific conductance versus discharge is plotted for two stations. Daily precipitation data are presented for three stations for water years 1977 through 1979. Water quality analyses are presented for five springs.

The type of groumdwater data taken during corehole drilling in 1977 and 1978 is summarized and sample well data sheets are presented. Water analyses of 28 samples taken during drilling are tabulated.

Appendices summarize field plans for Summer 1980, graphically present hydrologic data (transmissivity, discharge, potentiometric surfaces, water quality, water levels), and tabulate well level measurements.

ABSTRACT

Accession Number:
@ 784.13
TRW, June 1979, Oil shale data book: report prepared by TRW Energy Engineering Division, McLean, VA, for DOE, Rep. 97156-E015-RU-00.

Contact: John McCord (loan)

Key Categories: SURFACE, IN-SITU, PROCESS WATER USE, EFFLUENTS, COLORADO, ENVIRONMENTAL, WATER LAW

Access Code: 002 Use Code: 02

This book provides a ready reference for evaluation of appropriate recovery technologies and associated processes. It includes the latest available technical, economic, environmental, legal, water use and other relevant factors for all alternative options for beneficiation, surface and in situ retorting and upgrading

ABSTRACT

Accession Number:
@ 784.14
TRW, May 1979, Final report of hydrologic testing program on NOSR-1 for the period Aug. 15, 1978 to Oct. 28, 1978: report prepared by TRW Energy Engineering Division, McLean, VA, for DOE.

Contact: John McCord (loan)

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 02

The report provides a comprehensive report of hydrologic testing performed on NOSR-1 for the period August 15, 1978 through October 28, 1978. Work was performed on three new holes and seven previously drilled holes. The pump-test program resulted in data related to static water levels, values for transmissivity and coefficients of hydrologic conductivity, and estimates of coefficients of storage for the intervals tested. Analyses of the data resulted in recommendations for the following year's program.

ABSTRACT

Accession Number:
@ 784.15
Turk, J.1., 1981, Sediment chemistry at prospective surface-mining sites: in Water-resources investigations of the U.S. Geological Survey in Colorado - fiscal year 1981, U.S. Geological Survey Open-File Report 81-150, p. 31.

Contact: John Turk (status)

Key Categories: COLORADO, SEDIMENT

Access Code: 011 Use Code: 02

The purpose of this study is to define the present composition of soil and stream-bottom material in selected basins in Colorado. The chemistry of suspended material in the stream will be interpreted and a data base developed to evaluate changes in soil and bottom-material chemistry following surface mining of coal. The study area includes drainage of the Yampa and White River within Colorado.

Seive composited-soil and bottom-material samples from areas and streams within the basin are being studies to determine the chemistry of insoluble materials (-80-mesh fraction). Ratios of chemical concentration to suspended sediment are being compared during periods of peak discharge.

ABSTRACT

Accession Number:
@ 784.16
Turk, J.T., 1981, Effects of energy-production emissions on lakes: in Water-resources investigations of the U.S. Geological Survey in Colorado - fiscal year 1981, U.S. Geological Survey Open-File Report 81-150, p. 107.

Contact: John Turk (status)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 011 Use Code: 01

The purpose of this program is to evaluate the potential for acid rain pollution in lakes of northwestern Colorado. Susceptible lakes, based on their locations relative to acid-gas sources and occurrence in chemically unreactive formations, will be selected for study. The relative buffering capacity and nutrient loading capacity will be determined. Precipitation and weather stations will be installed, and samples of lake water and precipitation will be chemically characterized.

To date, lakes to be studed have been selected, and monitoring equipment is being installed.

ABSTRACT

Accession Number:
@ 784.17
Udis, B., Howe, C.W., and Kreider, J.F, 1976, Economic and environmental modeling in the Colorado River basin via input-output analysis: in Clyde, C.G., and Flakenborg, D.H., eds., Colorado River basin modeling studies, Utah Water Research Laboratory, p. 257-284.

Contact: Utah Water Research Laboratory (copy)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS, SALINITY, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 02

This report describes three interacting models which connect economic/industrial activity with environmental effects (water and air). This system utilizes the Colorado State University hydrosalinity model.

The hydrosalinity model consists of three components: an economic I/O interfacing package; a hydrologic model; and a salt flow model. The interfacing routine takes total gross output data from the regional economic model and converts these into demands for water and other consequent impacts. The hydrologic model computes depletions from evapotranspiration, municipal and industrial water consumption, and exports. It also computes flows and does reservoir routing.

ABSTRACT

Accession Number:
@ 785
Udis, B., Howe, C.W., and Kreider, J.F., 1973, The interrelationship of economic development and environmental quality in the Upper Colorado River basin--an interindustry analysis: Colorado Univ., Report to U.S. Dept. Comm., Econ. Devel. Adm., July 1973, EDA Research Grant OER 351-G-71-8 (99-7-13215), 642 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 785.1
Uintah Basin Soil Conservation District, 1981, Martin Lateral Watershed, Dry Gulch area, Duchesne and Uintah Counties: Utah watershed protection plan and environmental assessment: Soil Conservation Service Report, 49 p. plus appendices A-G.

Contact: Soil Conservation Service - Salt Lake City (copy)

Key Categories: UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 03

This document describes a watershed protection plan using land treatment practices to solve an irrigation water shortage and salinity problem. Planning considered no action and five different levels of contribution to solving the problem. Environmental impacts include reduced erosion, and improved downstream water quality by reducing salt load concentration by 0.19 mg/l. This document is intended to fulfill requirements of the National Environmental Policy Act and to be considered for authorization of PL 566 funding.

ABSTRACT

Accession Number:
@ 787
Union Oil Company of California, Union Synthetic Fuel Division, March 1977, Long Ridge experimental shale oil plant - mined land reclamation permit application: v. I.

Contact: Mined Land Reclamation Board (access)

Key Categories: SURFACE, RECLAMATION

Access Code: 011 Use Code: 01

This is Volume 1 of 3 of Union Oil Company's Mined Land Reclamation Permit Application to the State of Colorado. This volume contains a legal description of the permit area, an index map of the site, pre-mine and mine plan maps of affected lands, the mining plan, the reclamation plan, and a reclamation map. The mining plan contains a number of individual reports which address the following topics: spent shale pile stability, foundation investigations, results of field permeability tests, and geotechnical data on spent shale. The reclamation plan section includes a report on the vegetative stabilization of Union B spent shale.

ABSTRACT

Accession Number:
@ 788
Union Oil Company of California, Union Synthetic Fuel Division, March 1979, Long Ridge experimental shale oil plant - mined land reclamation permit application: v. II.

Contact: Mined Land Reclamation Board (access)

Key Categories: COLORADO, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SEDIMENT, CLIMATE

Access Code: 011 Use Code: 01

This is Volume 2 of 3 of Union Oil Company's Mined Land Reclamation Permit Application to the State of Colorado. This volume contains individual sections on water, wildlife, soils, vegetation, climate and reclamation cost estimates. The water section contains several informative reports that address existing surface and ground water quality monitoring, disposal pile water balances, and pile erosion. The climate section summarizes the results of meteorological and air quality baseline studies initiated July, 1974 and presents evaporation and precipitation data.

ABSTRACT

Accession Number:
@ 789
Union Oil Company of California, Union Synthetic Fuel Division, July 1979, Long Ridge experimental shale oil plant - mined land reclamation permit application: supplementary information.

Contact: Mined Land Reclamation Board (access)

Key Categories: SURFACE, LEACHING, COLORADO, SEDIMENT, SPRINGS

Access Code: 011 Use Code: 01

This is Volume 3 of 3 of Union Oil Company's Mined Land Reclamation Permit Application to the State of Colorado. This volume contains information in response to the State's comment on Volumes 1 and 2. The following additional information is presented in this volume: analyses of raw and spent shale leachates; estimates of soil loss from spent shale disposal piles; estimates of runoff and sediment discharge from spent shale disposal piles; estimates of potential impact of leachate discharges on East Fork Creek due to pile erosion; a single water quality analysis of a spring at the Long Ridge site; information on erosion mitigation measures; soil survey and analyses; and physical and chemical properties of Union spent shale.

ABSTRACT

Accession Number:
@ 790
University of Oklahoma, and Radian Corp., 1977, Energy from the West - a progress report of a technology assessment of western energy resource development: v. II. detailed analyses and supporting materials: U.S. Environmental Protection Agency Rep. EPA-600/7-77-072a.

Contact: NTIS (copy)

Key Categories: ENVIRONMENTAL, COLORADO, WYOMING, UTAH

Access Code: 182 Use Code: 02

This is a progress report of a three year technology assessment of the development of six energy resources (coal, geothermal, natural gas, oil, oil shale, and uranium) in eight western states (Arizona, Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, and Wyoming) during the period from the present to the year 2000. Volume I describes the purpose and conduct of the study, summarizes the results of the analyses conducted during the first year, and outlines plans for the remainder of the project. In Volume II, more detailed analytical results are presented. Six chapters report on the analysis of the likely impacts of deploying typical energy resource development technologies at sites representative of the kinds of conditions likely to be encountered in the eight-state study area. A seventh chapter focuses on the impacts likely to occur if western energy resources are developed at three different levels from the present to the year 2000. The two chapters in Volume III describe the political and institutional context of policymaking for western energy resource development and present a more detailed discussion of selected problems and issues. The Fourth Volume presents two appendices, on air quality modeling and energy transportation costs.

ABSTRACT

Accession Number:
@ 791
University of New Mexico School of Law, Jan. 1975, International symposium on the salinity of the Colorado River: Natural Resources Journal, v. 15.

Contact: New Mexico School of Law (copy)

Key Categories: COLORADO, UTAH, WYOMING, SALINITY, WATER LAW

Access Code: 002 Use Code: 03

On August 30, 1973, the United States and Mexico signed Minute 242 of the International Boundary and Water Commission, an agreement which the two governments described as the permanent and definitive solution to the problem of salinity on the Colorado River. The Instituto Mexicano de Estudios Diplomáticos, the American Society of International Law, and the Natural Resources Journal sponsored an international symposium on March 15, 1974, at Oaxtepec, Mexico, to analyze Minute 242, the situation which gave rise to it, and what it portends for the future. Papers were presented by political leaders, social and political scientists, economists, agronomists, engineers, and lawyers.

The present issue of the Natural Resources Journal contains the proceedings of the symposium together with other articles which bear on the subject.

ABSTRACT

Accession Number:
@ 791.1
University of Wisconsin, July 1975, Oil shale development in
northwestern Colorado: Water and related land impacts, Institute
for Environmental Studies, Madison, Wisconsin, Rep. IES-48, 254 p.

Contact: NTIS (copy)

Key Categories: PROCEEDINGS, COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 03

This study was made to examine the difficulties and benefits of an interdisciplinary inquiry into current and planned oil shale development, to determine and record data pertaining to land and water uses with and without various levels of oil shale extractive technology in the Piceance Creek Basin, and to assist the local and regional governments in the basin in planning for secondary impacts on the social, cultural, and economic framework of the area.

ABSTRACT

Accession Number:
@ 792
Upper Colorado River Commission, Annually, 1980 Annual report, Salt Lake City, Utah.

Contact: Upper Colorado River Commission (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, SURFACE WATER QUANTITY

Access Code: 042 Use Code: 01

This Annual Report includes, among other things, the following:

Membership of the Commission, its Committees, Advisers, and Staff;

Roster of meetings of the Commission;

Brief discussion of the activities of the Commission;

Engineering and hydrologic data;

Pertinent legal information;

Information pertaining to Congressional legislation;

Map of Upper Colorado River Basin;

Status of the Storage Units and participating projects of the Colorado River Storage Project;

Appendices containing:

Fiscal data, such as: budget, balance sheet, statements of revenue and expense, Transmountain Diversions, etc.

ABSTRACT

Accession Number:
@ 793
Utah Division of Water Resources, 1978, The state of Utah water, 1978.

Contact: Utah Dept. of Natural Resources (copy)

Key Categories: UTAH, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 182 Use Code: 03

This is the fourth general water-planning report published by the Division of Water Resources.

This report, the State of Utah Water - 1978, provides new estimates of water supply and use, obtained in conjunction with the 1975 National Water Assessment. The water situation in each multicounty district is discussed in some detail.

This report is not a water plan, rather this document is intended to highlight water planning activities in all areas of the State, and indicate potential developments.

ABSTRACT

Accession Number:
@ 794
Utah Division of Health, 1982, Clean Lakes study: study by Bureau of Pollution Control, Salt Lake City, Utah.

Contact: Jerry Riding (status)

Key Categories: UTAH, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

Section 314 of the Clean Water Act requires that each state identify and classify according to eutrophic conditions all publically owned fresh water lakes. They also must develop procedures and methods to control sources of pollution to these lakes and to restore their quality, as required. The clean lake study for Utah was due to be completed in March 1982.

ABSTRACT

Accession Number:
@ 794.1
Utah Division of Health, 1982, Water quality assessment: study by Bureau of Pollution Control, Salt Lake City, Utah.

Contact: Jerry Riding (status)

Key Categories: UTAH, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

Section 305 (b) of the Clean Water Act requires that each state submit biennially an assessment of water quality within the state. These reports must include: (1) description of water quality of all navigable waters during the preceeding year; (2) analysis of extent to which these waters are suitable for shellfish, wildlife and recreational uses; (3) description of nature and extent of nonpoint sources of pollutants and recommendations to control these; and others.

ABSTRACT

Accession Number:
@ 794.2
Utah Division of Health, 1965-1982, Wastewater disposal regulations: Part I: definitions and general requirements; Part II standards of quality for waters of the State; Part III: sewers and wastewater treatment works; Part IV: waste disposal regulations; Part V: small underground wastewater disposal systems; Part VI: surface disposal of produced waters; Part VII: underground injection control program.

Contact: Utah Bureau of Pollution Control (copy)

Key Categories: UTAH, WATER LAW

Access Code: 011 Use Code: 01

These are Utah's regulations which govern the disposal of wastewater. The most relevant sections of these regulations for this study are in Part II, standards of quality for waters of the State, and in Part VII, underground injection control program. Part II summarizes salinity and other water quality standards and classifies the waters of the State by beneficial use; streams or stream segments are listed and the beneficial uses (domestic source, recreation, aquatic and wildlife, and agriculture) of each segment are indicated. Part VI (draft) describes acceptable procedures for disposing of fluids by injection wells.

ABSTRACT

Accession Number:
@ 794.3
Utah Divison of Health, 1981, State of Utah UIC Program Description, (draft) 57 p.

Contact: Utah Bur. Poll. Control (copy)

Key Categories: WATER LAW, UTAH

Access Code: 011 Use Code: 02

This is a draft of Utah's primacy application to EPA Region VIII for the State's Underground Injection Control program, mandated under the Safe Drinking Water Act of 1974. This report overviews the proposed program, describes regulatory responsibilities for the State's program, presents the structure and organization of the Utah Department of Health, identifies staffing requirements and expenditures, defines the State UIC permitting process, and summarizes other data and information pertinent to the program.

ABSTRACT

Accession Number:
@ 794.4
Utah Division of Water Resources, 1980, White River Dam Project, proposed action plan: revised, third printing, 46 p. plus attachments.

Contact: Utah Division of Water Resources (copy)

Key Categories: UTAH, SEDIMENT, ENVIRONMENTAL, PROCESS WATER USE, SURFACE

Access Code: 011 Use Code: 02

This report describes the proposed White River Dam and presents Utah's analyses of its potential impacts. General information on the project area, including climate, topography, geology, and water supply, is overviewed. The facilities of the proposed project, including the dam and reservoir, pumping facilities, access roads, and others, are described. Diversion requirements from the dam for the White River Shale Project, the TOSCO Sand Wash Project, and for Ute Indian irrigation are described. Water supply alternatives for the White River Project are discussed. Various aspects of the operation of the project are analyzed and discussed in other sections. The results of studies or estimates of flood routing, minimum releases, allocation of storage, maximum reservoir drawdown, and sedimentation are provided. The results of a computer reservoir operation study based on mean monthly flow values for the period 1931-1978 are reported.

ABSTRACT

Accession Number:
@ 794.5
Utah Division of Water Resources, 1978, Update of Hydrologic Inventory of the Price River Study Unit, 24 p.

Contact: Utah Division of Water Resources (copy)

Key Categories: UTAH, PRESENT WATER USE, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 01

This report covers the drainage of the Price River. Although the Price River itself is outside of the boundaries of the Utah oil shale basin, the headwaters of several tributaries to the Price River originate within the oil shale basin. Thus, pertinent reports that cover the Price River drainage are included in this bibliography.

A hydrologic inventory of the Price River Basin was published by the Utah Division of Water Resources in 1975 using data obtained prior to 1970 (Utah Division of Water Resources, 1975; Abstract No. 794.6). The climatological, streamflow, diversion, and water related land use data were used to make a water budget analysis for the Price River Basin.

This addendum was prepared to evaluate the changes in water related land use, to gather additional streamflow and diversion records, and update water budgets for each subarea of the Price River Basin. A summary water budget for the entire drainage basin was also prepared.

The water budgets in this report differ from the water budgets in the original inventory because of the availability of additional data and the time base used. The domestic water diversions were based on limited and estimated data in the original inventory. Detailed records are now available. Also, a longer detailed record of irrigation diversions was used in this report.

ABSTRACT

Accession Number:
@ 794.6
Utah Division of Water Resources, 1975, Hydrologic inventory of the
Price River basin, 63 p.

Contact: USGS Library - Salt Lake City (loan)

Key Categories: UTAH, AVAILABLE WATER BY BASIN, CLIMATE, PRESENT WATER USE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 02

This report covers the drainage of the Price River. Although the Price River itself is outside of the boundaries of the Utah oil shale basin, the headwaters of several tributaries to the Price River originate within the oil shale basin. Thus, pertinent reports that cover the Price River drainage are included in this bibliography.

This report inventories climatological, streamflow, groundwater occurrence, water quality, and water related land use data obtained prior to 1970. This information is then used to construct water budget analyses for the Price River Basin. The information in this report was updated in an addendum released by the Utah Division of Water Resources in 1978 (Abstract No. 749.5).

ABSTRACT

Accession Number:
@ 794.7
Utah Division of Water Rights, 1959-present, Commissioners Reports.

Contact: Bob Morgan (loan)

Key Categories: UTAH, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, PRESENT WATER USE

Access Code: 002 Use Code: 01

In Utah, a Commissioner is assigned to each river to oversee diversions in regard to water rights problems. Each Commissioner files an annual report with the Division of Water Rights that contains water diversions, and sometimes, water quality information. In the Utah oil shale basin, there are Commissioner Reports that cover the following drainages and periods of record: (1) Brush Creek (1959-65); (2) Deep Creek (1971-79); (3) Duchesne-Strawberry (1959-present); (4) Lakefork-Uintah (1928-present); (5) Pot Creek (1959-present); (6) Nine Mile (1970-present); (7) Ashley Creek (1962-68); and (8) Burnt Fork of Birch Creek (1962-present).

ABSTRACT

Accession Number:
@ 794.6
Utah Division of Water Rights, July 1981, Water level and total dissolved solids contour maps for aquifers in Utah, Parts I and II, 28 plates.

Contact: Jerry Riding (copy)

Key Categories: GROUNDWATER QUANTITY, GROUNDWATER QUALITY, UTAH

Access Code: 011 Use Code: 01

The maps contained in this report were prepared by the Utah Division of Water Rights under contract to the Utah Division of Environmental Health for the U.S. Environmental Protection Agency Underground Injection Control (UIC) program. The maps show water level and total dissolved solids (TDS) concentration contours, respectively, for groundwater aquifers in Utah.

The contours shown on the maps represent values for the principal alluvial aquifers, execpt in the Colorado River Area where alluvial aquifers are thin and discontinuous and the quality and other characteristics of the groundwater generally varies from geologic formation to formation.

These maps are intended to be used as working maps in the administration of the Underground Injection Control (UIC) program and to supplement and support information contained in the report entitled Identification and Characteristics of Aquifers in Utah, July, 1981.

ABSTRACT

Accession Number:
@ 794.9
Utah Division of Water Rights, Nov. 1980, Utah water use data, public water supplies 1960-1978: Utah Water Use Report no. 1, 250 p.

Contact: USGS - Salt Lake City (copy)
Utah Division of Water Rights (copy)

Key Categories: UTAH, PRESENT WATER USE

Access Code: 011 Use Code: 01

The U.S. Geological Survey and the Utah Division of Water Rights entered into an agreement in 1977 to begin a water use inventory in the state in conjunction with and to provide data for the the National Water Use Data System (NWUDS). This publication is the first of a continuing series of reports to be published which presents data collected in Utah's water use survey. In addition to the NWUDS, the Utah Division of Water Rights is developing a water-use data base which will include a detailed inventory of supply facilities, return facilities, sources of supply, conveyance structures, and water use data.

This report contains county maps which show public water suppliers that were inventoried and graphs which show per capita withdrawal rates for the period 1960-1978 at selected public water supply facilities. Other tables tabulate yearly average gallons per capita per day by county, distribution of water supply (surface water, groundwater, purchased water) by county for the state, reliability of data and total reported water use between 1960-1978 for each municipality.

ABSTRACT

Accession Number:
@ 795
Utah, State of, 1971, Environmental problems of oil shale: environmental statement prepared in compliance with Section 102(2)(C), Public Law 91-190.

Contact: BLM - Vernal (loan)

Key Categories: ENVIRONMENTAL, UTAH

Access Code: 112 Use Code: 03

This report was prepared by the Committee on Environmental Problems of Oil Shale, State of Utah, as input to the environmental impact statement for the Prototype Oil Shale Leasing Program. It reviews the potential environmental impacts of an oil shale industry in Utah, based on published literature through 1971.

ABSTRACT

Accession Number:
@ 795.1
Utah State University, 1981, Annual report 1981, Utah Water Research Laboratory, Center for Water Resources Research, Agricultural and Irrigation Engineering: General Series Rep. UWRL/G-81/02, 188 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: UTAH, SALINITY, ENVIRONMENTAL, PRESENT WATER USE

Access Code: 011 Use Code: 01

This report describes the 129 projects active during the 1980-81 academic year at the Utah Water Research Laboratory (including studies performed at the Laboratory by the Fisheries Co-op Unit and the Mechanical Engineering Department); elsewhere on the Utah State University campus as supported by the Office of Water Research and Technology, U.S. Department of the Interior, and administered through the Utah Center for Water Resources Research; and in the Department of Agricultural and Irrigation Engineering, College of Engineering.

The 125 projects address a great variety of water problems. Individual studies explore the sources and movement of salinity in the Colorado River, the pollution of shallow aquifers, safety analysis in the design of engineering structures, the design of furrow irrigation systems, the protection of public water supplies against contamination by cancer-causing agents from oil shale development, the physics of how cloud seeding increases snowfall, and the recalibration of flow measuring devices.

Each of the 125 projects are outlined in the body of this joint UWRL/UCWRR/AIE annual report. The next section of this report gives one sentence summaries of each project grouped by program area. For more information, one can go to the fuller descriptions described in the body of this report, obtain the project-produced literature cited there, or contact the principal investigator(s). The cited reports can be obtained through the UWRL Editor or Librarian.

ABSTRACT

Accession Number:
@ 795.2
Utah State Engineer's Office, no date, Utah water rights records.

Contact: Harold Donaldson (status)

Key Categories: UTAH, GROUNDWATER QUANTITY, SURFACE WATER QUANTITY, WATER LAW

Access Code: 002 Use Code: 01

Utah water rights information may be accessed in the State Engineer's Office in Salt Lake City or in the District Office in Vernal. All filings are located on plats and backed up by a file which is maintained in the State Engineer's Office in Salt Lake City. Adjudicated rights are published periodically and are being plotted on Hydrology Survey maps at a scale of 500 f to the inch. This work is being done in the Vernal Office under the direction of Bob G y, and copies of the maps are on file in Salt Lake City. Complete maps coverage is available for the northern part of the Uinta basin; the southern portion of the basin is not mapped yet.

ABSTRACT

Accession Number:
@ 796
Utah State Engineer's Office, 1966, Summary of water well drilling activities in Utah, 1960 through 1965: Information Bulletin No. 16, 13 p.

Contact: Utah Division of Water Rights (loan)

Key Categories: GROUNDWATER QUANTITY, PRESENT WATER USE, UTAH

Access Code: 002 Use Code: 02

This bulletin summarizes data for water wells drilled in Utah between 1960 and 1965 by county, nature of use, well diameter, and footage drilled. During this period, a total of 161 water wells were drilled in Uintah County. By nature of use, they are: 7 mining, 150 miscellaneous (multi-use or industrial), 3 irrigation, and 1 stock watering.

ABSTRACT

Accession Number:
@ 797
Utah State Engineer's Office, 1964, (2nd edition), Water laws of Utah
and interstate compacts and treaties: Salt Lake City, Utah.

Contact: none

Key Categories: UTAH, WATER LAW

Access Code: 000 Use Code: 03

ABSTRACT

Accession Number:
@ 797.1
Utah State Engineer, no date, Utah oil and gas well records.

Contact: Harold Donaldson (status)

Key Categories: GROUNDWATER QUANTITY, UTAH

Access Code: 002 Use Code: 02

These records, maintained at the Utah State Engineer's office, present core logs, geophysical logs, and aquifer data.

ABSTRACT

Accession Number:
@ 797.2
Utah State Engineer, no date, Utah state well records.

Contact: Harold Donaldson (status)

Key Categories: UTAH, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 02

These records, maintained at the Utah State Engineer's office, present well logs, water level elevation, aquifer test data and water rights for registered wells in the state.

ABSTRACT

Accession Number:
@ 798
Utah State University and Utah Water and Power Board, March 1963,
Developing a state water plan: Utah's water resources--problems and needs, a challenge.

Contact: BLM - Vernal (loan)

Key Categories: CLIMATE, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, PRESENT WATER USE, WATER LAW, UTAH

Access Code: 112 Use Code: 03

This report reviews and evaluates Utah's water resources as viewed in 1970. The report overviews the existing water resources, discussing the hydrologic cycle, precipitation, temperature, water yield, groundwater, evaporation, and evapotranspiration. Water budgets for hydrologic units are presented, together with hydrologic inventories. Water quality and water rights considerations are presented. This information forms the background for identifying deficiencies and for outlining solutions, in existing water programs. The report outlines basic data deficiencies, reviews existing programs for water planning and development, and compares these with other state and federal programs. The report concludes with a discussion of the importance of and need for state water planning.

ABSTRACT

Accession Number:
@ 799
Utah Water Research Laboratory, 1978, New directions in western water law: Sixth annual conference of the Utah section of American Water Resources Assoc., 114 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: WATER LAW, UTAH, PROCEEDINGS

Access Code: 011 Use Code: 02

These proceedings present a number of technical papers that address western water law issues that are important to energy development in Utah. Articles are included that discuss the acquisition of water by Utah Power and Light Company for steam electric plants; that address State regulation of weather modification; and that discuss water right transfers and Federal reserved and Indian water rights.

ABSTRACT

Accession Number:
@ 800
Utah Water Research Laboratory, 1978, Utah water laws, politics, institutions: Aquarius Utah Water Research Laboratory Special Issue No. 2, 33 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: WATER LAW, UTAH

Access Code: 011 Use Code: 03

This article, intended for the lay public, is laid out in a question and answer format. It broadly discusses water law and water institutions in Utah (i.e.., irrigation companies, private utilities, etc.) and it presents a bibliography on water and water law.

ABSTRACT

Accession Number:
@ 801
Utah Water Research Laboratory, 1975, Impacts of energy development on Utah water resources: Third Annual Conference of the Utah Section of American Water Resources Association, 246 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: AVAILABLE WATER BY BASIN, PRESENT WATER USE, UTAH, SALINITY, ENVIRONMENTAL, PROCEEDINGS, WATER LAW

Access Code: 011 Use Code: 03

This proceedings presents a number of technical papers that address energy and water use in Utah. Some of the pertinent titles that are directly related to the present study are: (1) Water for Energy; (2) Water for Future Energy Development in Utah; (3) Salinity Impacts of Energy Development in Utah; (4) The Politics of Water and Energy Development in Utah; (5) Water Resources for Utah Oil Shale Development; (6) A Water Supply for the Energy Industry; and (7) Water challenges in Carbon and Emery Counties.

ABSTRACT

Accession Number:
@ 802
Utah Water Research Laboratory, 1975, Colorado River regional assessment study: Part One - Four, Utah Water Research Laboratory Rep. PRWG165-1.

Contact: Utah State University Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, SURFACE WATER QUALITY, ENVIRONMENTAL

Access Code: 011 Use Code: 02

The purpose of this study is to assess the effects of implementing the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) on water quality, technological, economic, social, and environmental conditions in the Colorado River basin.

The major areas of investigation encompassed by the study are (1) the impact of PL 92-500 on the salinity problem in the Colorado River basin, (2) the impact of PL 92-500 on municipal and industrial point sources, and (3) a specific site study of the environmental impact of PL 92-500. The report presenting the analysis and results of these study areas is organized in four parts:

PART ONE:	Executive Summary, Basin Profile, and Report Digest
PART TWO:	Detailed Analyses, Narrative Description, Data, Methodology, and Documentation
PART THREE:	Area-Specific Water Quality Analysis and Environmental Assessment
PART FOUR:	Appendices

ABSTRACT

Accession Number:
@ 802.1
Utter, S., 1978, Oil shale energy and the environment: Morgan, J.D., ed., in Fifth annual UMR-DNR conference on energy, Rolloa, Missouri, University of Missouri, 511-531 p.

Contact: NTIS (copy)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 03

Shale oil can be produced from oil shale by true in situ, modified in situ, and surface retorting methods. Both modified in situ and surface methods require mining of the oil shale. The environmental implications of an oil shale mining industry are reviewed and the impacts upon land use, air and water quality, and ecological systems discussed. The Bureau's mining environmental research program is described and the results to date summarized.

ABSTRACT

Accession Number:
@ 802.2
Vance, H.M., and Whaley, B.L., April 1971, Snow frequency analysis for Oregon and Utah: in Proceedings of 39th Annual Meeting of Western Snow Conference, Billing, Montana, p. 34-38.

Contact:

Key Categories: UTAH, CLIMATE

Access Code: 002 Use Code: 02

Snow-water content and depth frequence were analyzed using the Log-Pearson type 3 method on all Soil Conservation Service snow courses in Oregon and Utah with more than 5 years of record. The data generated can be used to predict expected snow loads, locate potential winter recreation areas, and for other uses. Physical location of the snow measuring sites with respect to topography, exposure, and orographic barriers helps to interpret snow frequency data.

ABSTRACT

Accession Number:
@ 802.3
Vincent, J.R., and Russell, J.D., Aug. 1971, Alternative for salinity management in the Colorado River basin: Paper 71076, Water Resources Bulletin, v. 7, no. 4, p. 856-866.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 002 Use Code: 03

The Colorado River basin faces the dilemma of an increasing demand for water while presently struggling with salinity concentrations approaching critical levels. Based upon projected development, salinity concentrations are predicted to exceed 1200 mg/l at Imperial Dam by the year 2010. Annual losses to the basin economy resulting from increased salinity will exceed $50 million by 2010. Although methods of controlling salt discharged are relatively unrefined, certain conclusions, based upon bayesian statistical methods, can be reached. Five basic alternatives for coping with the problem are evaluated. Total costs associated with any alternative, or the resulting salinity, are the sum of salinity detriments (cost to users for water of increased salinity plus economic multiplier effects) and the cost of constructing salt discharge control works. These impacts upon basin economy and Colorado River water quality for each alternative are presented.

ABSTRACT

Accession Number:
@ 802.4
Voegeli, P.T., Sr., and Claassen, H.C., 1971, Radiochemical analyses of water from selected streams, wells, springs, and precipitation collected prior to reentry drilling, Project Rulison: U.S. Geological Survey Open-File Report USGS-474-83 (Rulison-6), 16 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, SURFACE WATER QUANTITY, GROUNDWATER QUANTITY, SPRINGS

Access Code: 002 Use Code: 02

The U.S.G.S. established a water-sampling network in Central and Western Colorado on behalf of the U.S. Atomic Energy Commission to sample the hydrologic environment prior to and during the reentry drilling and the gas-production test phase of Project Rulison, an experiment to stimulate gas production from a low yield reservoir by a nuclear explosion. Samples obtained from selected streams, wells, springs, and from precipitation are analyzed for tritium, gross alpha, and gross beta activity. The analysis are made in laboratories of the U.S.G.S., Denver, Colorado. This report contains data from analyses of samples from the network collected prior to reentry drilling (stated April 28, 1970), including sample data obtained both prior to and after the nuclear detonation. The data are intended to give representative values over approximately a 1-year period and to show variations in natural radioactivity.

ABSTRACT

Accession Number:
@ 803
Voegeli, P.T., Sr., West, S.W., and Cordes, E.H., March 1979,
Geohydrology - Project Rulison, Garfield County, Colorado: U.S.
Geological Survey Survey Open-File Report, 52 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 002 Use Code: 02

The Project Rulison nuclear experiment was detonated at a depth of 8,425 ft. below ground level at the Rulison site in Garfield County, Colorado, September 10, 1969. The experiment was designed to stimulate natural gas production from a gas-bearing formation of low permeability. All zones below a depth of 6,129 ft in the Rulison exploratory hole that yielded any water during drilling, or zones interpreted from geophysical logs as being likely to contain water, were hydraulically tested. The pressures recorded during the drill-stem tests of the different zones indicated negligible or no fluid entry to the hole. No fluid was recorded on any of the swab tests performed during the drill-stem tests. Studies of preshot and postshot hydrologic conditions indicate that the detonation did not significantly or permanently affect wells, springs, streams, shallow aquifers or reservoirs in or near the Rulison site.

ABSTRACT

Accession Number:
@ 803.1
Voegeli, P.T., Sr., and King, R.U., 1969, Occurrence and distribution of molybdenum in the surface water of Colorado: U.S. Geological Survey Water-Supply paper 1535-N, p. N1-N32, 32 p.

Contact: Public Inquiries Office (copy)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

Molybdenum was detected in 89% of the samples collected from all the principal Colorado streams and their chief tributaries and from a few reservoirs and lakes. Amounts detected ranged from 1 to 3,8000 micrograms per liter. The greatest amounts of molybdenum detected were in samples from the Colorado River at and below Kremmling, the Dillon reservoir, the Blue River below Kremmling, the Dillion reservoir, The Blue River below Dillion Dam, the Eagle River, and Tenmile Creek.

ABSTRACT

Accession Number:
@ 803.2
Waddell, K.M., Dodge, J.E., Darby, D.W., and Theobald, S.W., 1982,
Hydrology of the Price River basin, Utah, with emphasis on selected coal-field areas, Geological Survey Water Supply Paper, (in review)

Contact: none

Key Categories: UTAH, CLIMATE, SPRINGS, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, SEDIMENT, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 002 Use Code: 01

This report covers the drainage of the Price River. Although the Price River itself is outside of the boundaries of the Utah oil shale basin, the headwaters of several tributaries to the Price River originate within the oil shale basin. Thus, pertinent reports that cover the Price River drainage are included in this bibliography.

This report is undergoing review within the U.S. Geological Survey during 1982 and has not been approved for publication as of March 1982. The following brief abstract is based on a personal communication from Kidd Waddell on January 19, 1982.

This study describes the hydrology of coal-field areas of the Price River basin. Hydrologic reconnaissance data are used to describe the seasonal variations of flow of springs; groundwater-surface water relationships; hydraulic properties of the groundwater aquifer; flood characteristics of streams; groundwater recharge and discharge relationships; nutrient and inorganic loading in streams and Scofield Reservoir; mineralogic composition and depositional rates of sediments; and water budgets for selected basins. Recommendations are made for additional study and suggested approaches and procedures for monitoring to detect possible hydrologic changes caused by coal mining.

ABSTRACT

Accession Number:
@ 804
Waddell, K.M., Contratto, P.K., Sumsion, C.T., and Butler, J.R., 1981, Hydrologic reconnaissance of the Wasatch Plateau-Book Cliffs coal field area, Utah: U.S. Geological Survey Water-Supply Paper 2068, 45 p. plus 9 plates.

Contact: Public Inquiries Office (copy)

Key Categories: UTAH, SPRINGS, CLIMATE, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

This study was designed to provide an assessment of the hydrology of the Wasatch Plateau-Book Cliffs coal-fields area in Utah. The objectives of the study were to establish data bases for hydrologic parameters to describe the water resources based on available data, and to recommend monitoring programs and additional detailed studies that might be needed.

Data obtained during a hydrologic reconnaissance in 1975-77 (Abstract No. 805) in the Wasatch Plateau Book Cliffs coal-fields area of Utah were correlated with existing long-term data. Maps were prepared showing average precipitation, average streamflow, stream temperature, ground- and surface-water quality, sediment yield, and geology. Recommendations were made for additional study and suggested approached for continued monitoring in the coal-fields areas.

During the 1931-75 water years, the minimum discharges for the five major streams that head in the area ranged from about 12,000 to 26,000 acre-feet per year, and the maximum discharges ranged from about 59,000 to 315,000 acre-feet per year. Correlations indicate that 3 years of low-flow records at stream sites in the Wasatch Plateau would allow the development of relationship with long-term sites that can be used to estimate future low-flow records within a standard error of about 20 percent.

Most water-quality degradation in streams occurs along the flanks of the Wasatch Plateau and Book Cliffs. In the uplands, dissolved-solids concentrations generally ranged from less than 100 to about 250 milligrams per liter, and in the lowlands, the concentrations ranged from about 250 to more than 6,000 milligrams per liter.

Most springs in the Wasatch Plateau and Book Cliffs discharge from the Star Point Sandstone or younger formations, and the water generally contains less than about 1,000 milligrams per liter of dissolved solids. The discharges of 65 springs ranged from about 0.2 to 200 gallons per minute. The Blackhawk Formation, which is the principal coal-bearing formation, produces water in many of the mines. The dissolved-solids concentration in water discharging from springs and mines in the Blackhawk ranged from about 60 to 800 milligrams per liter.

In the lowland areas, the Ferron Sandstone Member of the Mancos Shale appears to have the most potential for subsurface development of water of suitable chemical quality for human consumption. Three wells in the Ferron yielded water with dissolved-solids concentrations ranging from about 650 to 1,230 milligrams per liter.

ABSTRACT

Accession Number:
@ 805
Waddell, K.M., and others, 1978, Selected hydrologic data, Wasatch Plateau-Book Cliffs coal-fields area, Utah: U.S. Geological Survey Open-File Report 78-121, (also published as Utah Basic-Data Release 31), 33 p. plus 1 plate.

Contact: USGS - Salt Lake City (copy)

Key Categories: UTAH, SPRINGS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

This report presents data gathered by the U.S. Geological Survey as part of a hydrologic reconnaissance carred out during the period July 1975-September 1977 in cooperation with the U.S. Bureau of Land Management, as well as selected information for water-years 1931-75. The data were obtained in the field or from private, State, and other Federal agencies.

This report summarizes chemical analyses and discharge measurements for selected wells, springs, and mines. Lithologic logs and well level data are also presented for selected sites. Chemical analyses, including major ions, trace metals, and organic, biological, and nutrients parameters, are summarized for selected stream sites and, mineralogical analyses and grain-size statistics are presented for streambed samples.

ABSTRACT

Accession Number:
@ 806
Wagner, P., and others, 1981, Assessment and control of water contamination associated with shale oil extraction and processing: annual report for Oct. 1979 - Sept. 1980, draft report, Los Alamos Scientific Laboratory.

Contact: Paul Wagner (status)

Key Categories: LEACHING, IN-SITU

Access Code: 011 Use Code: 01

This is an annual progress report from the Los Alamos Scientific Laboratory research program on in-situ leaching. This program is focusing on the nature and magnitude of water contamination that might result from in-situ oil shale retorting. This report describes results of laboratory leaching studies on three cores through Occidental's Retort 3E, of experimental investigations of the effect of retorting conditions on leachate quality, and of engineering calculations on the use of multi-staged leaching as a control technology for underground retorts.

ABSTRACT

Accession Number:
@ 807
Wagner, P., Peterson, E.J., and Wanek, P.L., 1980, Assessment and control of water contamination associated with shale oil extraction and processing: annual report, Oct. 1, 1978 - Sept. 30, 1979, Los Alamos Scientific Laboratory Rep. LA-8506-PR, 50 p.

Contact: Paul Wagner (copy)

Key Categories: LEACHING, IN-SITU

Access Code: 011 Use Code: 02

An integrated assessment of environmental control technologies applicable to shale oil development is reported. Air quality, water quality, potential surface disruption, potential problem areas, and research needs have been assessed, and finally, environmental control technologies have been indicated. The experimental program attempts to identify mechanisms and kinetics of trace element release from raw and spent shales, the effects of these releases on water quality, and methods for control of potential contaminants. Our study emphasizes the nature, extent, transport, and fate of contaminants occurring as waste and as an effect of retort parameters. Our experiments confirmed that concentrations of soluble species in product waters, laboratory-generated leachates, and natural water systems are controlled by the variables mentioned.

Although preliminary experiments have pointed to some concerns as yet unresolved and have indicated the difficulty of developing an integrated environmental control technology, a *complete* information and data base must be developed to avoid premature judgments based on these incomplete findings.

ABSTRACT

Accession Number:
@ 808
Wahl, K.L., 1970, A proposed streamflow data program for Wyoming:
U.S. Geological Survey Open-File Report, 44 p.

Contact: Open-File Services Section (copy)

Key Categories: WYOMING, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 03

An evaluation of the streamflow data available for Wyoming was made to provide guidelines for planning future programs. The basic steps in the evaluation procedure were (1) definition of the long-term goals of the streamflow data program, (2) examination and analysis of all available data to determine which goals have already been met, and (3) consideration of alternate programs and techniques to meet the remaining goals. Because of limitations in the regression model and a general lack of streamflow data for nonmountainous areas of Wyoming, none of the goals could presently be met by generalization of existing data by regression analysis. The regression method may be more successful at a future time if a more suitable model can be developed, and if an adequate sample of streamflow records can be obtained in the nonmountainous areas. In the meantime, methods of transferring flow characteristics which require some information at the ungaged site may be used. A streamflow data program based on the guidelines developed in this study is proposed which includes recommendations for establishing 16 new stream-gaging stations, reactivating 18 stations, and discontinuing 25 existing stations.

ABSTRACT

Accession Number:
@ 809
Wallace, J.R., Culbertson, W.J., Habenicht, C.H., and Shaffron, M., 1981, A transportable steam stripper for the pilot scale treatment of oil shale wastewaters: design, field testing, and chemical analysis: in Proceedings of the 14th Oil Shale Symposium, Golden, Colorado, Colorado School of Mines Press, p. 330-336.

Contact: Colorado School of Mines (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 03

In September, 1980, a pilot-scale steam stripper was field tested in conjunction with the operation of the 150 ton Simulated In Situ Retort located at the Laramie Energy Technology Center. During operation of the retort, the steam stripper was integrated with the remaining pollution control equipment, in cluding a venturi scrubber and thermal oxidizer, and significant interactions were observed. This test, the first field operation of the DRI transportable steam stripper, also provided useful information on system mechanical and operational stability. This information is now being incorporated into a redesigned system which will include more reliable measurement equipment and automatic controls.

The methods of chemical analysis required for the operation of the steam stripper are also discussed including, in particular, methods for determination of sulfide and total dissolved solutes. It is important to note that levels of sulfide up to 450 mg/l were observed in the wastewater from the venturi scrubber, although these concentrations rapidly decayed even in filtered and refrigerated samples. The latter result may explain why sulfide has not usually been found in wastewater from direct mode retorts and cautions against the determination of sulfur species on stored samples.

ABSTRACT

Accession Number:
@ 810
Ward, J.C., and Reinecke, S.E., June 1972, Water pollution potential of snowfall on spent oil shale residues: report prepared by Colorado State University, Fort Collins, Colorado for Laramie Energy Research Center, Laramie, Wyoming, Grant No. G-0111280, 56 p. plus 2 charts.

Contact: Dick Poulson (loan)
NTIS (copy)

Key Categories: LEACHING, SURFACE, COMPUTER MODELS

Access Code: 011 Use Code: 01

Concentration and composition of total dissolved solids were determined in both surface runoff water and in water which had percolated through the bed of TOSCO spent shales. An empirical equation was developed to predict the concentration of TDS in runoff water as a function of independent parameters. A tendency for saturation of the residue to occur during a period of snowmelt was revealed. The effects of this saturation on the residue were also considered.

An overland flow water quality model was developed and successfully applied to runoff resulting from rainfall and snowfall on oil shale retorting residue. The surface water runoff from snowfall on oil shale residue has less water pollution potential than the runoff from rainfall.

It was shown that the concentration of dissolved solids in the runoff was a function of the cumulative volume of runoff per unit width, the porosity of the oil shale retorting residue, the soil moisture content, and the snowmelt rate, and the fraction of snowmelt water that appears as runoff.

ABSTRACT

Accession Number:
@ 811
Ward, J.C., Margheim, G.A., and Löf, G.O.G., Dec. 1971, Water pollution potential of spent oil shale residues from above-ground retorting: U.S. Environmental Protection Agency Water Pollution Control Research Series, Rep. 140 30 EDB , 123 p.

Contact: U.S. Government Printing Office (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 01

Physical properties, including porosity, permeability, particle size distribution, and density of spent shale from three different retorting operations, (TOSCO, USBM, and UOC) have been determined. Slurry experiments were conducted on each of the spent shales and the slurry analyzed for leachable dissolved solids. Percolation experiments were conducted on the TOSCO spent shale and the quantities of dissolved solids leachable determined. The concentrations of the various ionic species in the initial leachate from the column were high. The major constituents, $SO_4{}^{2-}$ and Na^+, were present in concentrations of 90,000 and 35,000 mg/l in the initial leachate; however the succeeding concentrations dropped markedly during the course of the experiment. A computer program was utilized to predict equilibrium concentrations in the leachate from the column. The extent of leaching and erosion of spent shale and the composition and concentration of natural drainage from spent shale have been determined using oil shale residue and simulated rainfall. Concentrations in the runoff from the spent shale have been correlated with runoff rate, precipitation intensity, flow depth, application time, slope, and water temperature.

ABSTRACT

Accession Number:
@ 812
Warner, J.W., and Heimes, F.J., 1979, A preliminary evaluation of ground water contributions to salinity of streams in the Upper Colorado River basin in Colorado and adjacent parts of Wyoming and Utah: U.S. Geological Survey, Denver contract to Bureau of Land Management, draft.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, SALINITY

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 813
U.S. Water Resources Council, Oct. 1980, The Nation's water resources, 1975-2000, v. I, summary.

Contact: U.S. Government Printing Office (copy)

Key Categories: COLORADO, WYOMING, UTAH, PRESENT WATER USE

Access Code: 152 Use Code: 01

The Water Resource Planning Act of 1965 (Public Law 89-80) directs the U.S. Water Resources Council to maintain a continuing study of the Nation's water and related land resources and to prepare periodic assessments to determine the adequacy of these resources to meet present and future water requirements. In 1968, the Water Resources Council reported the results of its initial assessment. The Second National Water Assessment, a decade later, provides a comprehensive nationally consistent data base for the water resources of the United States.

The final report of the Second National Water Assessment consists of four separate volumes. Volume 1, Summary, gives an overview of the Nation's water supply, water use, and critical water problems for 1975, 1985, and 2000 and summarizes significant concerns.

ABSTRACT

Accession Number:
@ 813.1
U.S. Water Resources Council, Dec. 1978, The nation's water
resources, 1975-2000: v. 1: Summary: Second National Water
Assessment, Washington, D.C.

Contact: U.S. Government Printing Office (copy)

Key Categories: COLORADO, WYOMING, UTAH, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 01

The Water Resources Planning Act of 1965 (Public Law 89-80) directs the U.S. Water Resources Council to maintain a continuing study of the Nation's water and related land resources and to prepare periodic assessments to determine the adequacy of these resources to meet present and future water requirements. In 1968, the Water Resources Council reported the results of its initial assessment. The Second National Water Assessment, a decade later, provides a comprehensive nationally consistent data base for the water resources of the United States. The results of the Second National Water Assessment were obtained by extensive coordination and collaboration in three phases.

The final report consists of four separate volumes. Volume 1, Summary, gives an overview of the Nation's water supply, water use, and critical water problems for 1975, 1985, and 2000 and summarizes significant concerns.

ABSTRACT

Accession Number:
@ 813.2
U.S. Water Resources Council, Dec. 1978, The nation's water resources, 1975-2000: v. 2: Water quantity, quality, and related land considerations: Second National Water Assessment, Washington, D.C.

Contact: U.S. Government Printing Office (copy)

Key Categories: UTAH, COLORADO, WYOMING, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 01

The Water Resources Planning Act of 1965 (Public Law 89-80) directs the U.S. Water Resources Council (WRC) to maintain a continuing study of the Nation's water and related land resources and to prepare periodic assessments to determine the adequacy of these resources to meet present and future water requirements. In 1968, the WRC reported the results of its initial assessment. The Second National Water Assessment, a decade later, provides comprehensive nationally consistent data base for the water resources of the U.S.

The final report consists of four separate volumes. Volume 2, water quantity, quality, and related land considerations, consists of one publication with five parts.

Part I outlines the origin of the Second National Water Assessment, states its purpose and scope, explains the numerous documents that are part of the assessment, and identifies the individuals and agencies that contributed to the assessment.

Part II identifies ten general water problem issues and their implications and potential consequences.

Part III focuses on the national perspectives regarding existing ("1975") and projected (1985 and 2000) requirements for water to meet offstream, instream, and flow-management needs. State, regional and Federal perspectives are compared.

Part IV analyzes the adequacy of fresh-water supplies (ground and surface) to meet existing and future requirements. It contains a national water budget; quantifies surface- and groundwater supplies, reservoir storage, and transfers of water within and between subregions; describes regional requirements and compares them to supplies; evaluates water quality conditions; and discusses the legal and institutional aspects of water allocation.

Part V covers existing conditions and future requirements for each of the 21 water resources regions. Within each regional synopsis is a discussion of functional and location-specific water-related problems; regional recommendations regarding planning, reserach, data, institutional aspects of solving regional water-related problems; a problem-issue matrix; and a comparative-analysis table.

ABSTRACT

Accession Number:
@ 813.3
U.S. Water Resources Council, Dec. 1978, The nation's water resources, 1975-2000: v. 3: Analytical data summary: Second National Water Assessment, Washington, D.C. 89 p.

Contact: U.S. Government Printing Office (copy)
Colorado Water Conservation Board (copy)

Key Categories: UTAH, COLORADO, WYOMING, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 011 Use Code: 01

The Water Resources Planning Act of 1965 (Public Law 89-80) directs the U.S. Water Resources Council (WRC) to maintain a continuing study of the Nation's water and related land resources and to prepare periodic assessments to determine the adequacy of these resources to meet present and future water requirements. In 1968, the WRC reported the results of its initial assessment. The Second National Water Assessment, a decade later, provides comprehensive nationally consistent data base for the water resources of the U.S. The results of the Second National Water Assessment were obtained by extensive coordination and collaboration in three phases.

The final report consists of four separate volumes.

Volume 3 "Analytical Data", describes the methods and procedures used to collect, analyze, and describe the data used in the assessment. National summary data are included with explanatory notes. Volume 3 is supplemented by five separately published appendixes that contain data for the regions and subregions.

ABSTRACT

Accession Number:
@ 813.4
U.S. Water Resources Council, Dec. 1978, The nation's water resources, 1975-2000: v. 3: Analytical data, Appendix II, Annual water supply and use analysis: Second National Water Assessment: Washington, D.C., 174 p.

Contact: U.S. Government Printing Office (copy)
Colorado Water Conservation Board (copy)

Key Categories: COLORADO, WYOMING, UTAH, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 011 Use Code: 01

The Water Resources Planning Act of 1965 (Public Law 89-80) directs the U.S. Water Resources Council (WRC) to maintain a continuing study of the Nation's water and related land resources and to prepare periodic assessments to determine the adequacy of these resources to meet present and future water requirements. In 1968, the WRC reported the results of its initial assessment. The Second National Assessment, a decade later, provides a comprehensive nationally consistent data base for the water resources of the United States.

The final report consists of four separate volumes. Appendix II of Volume 3, "Annual Water Supply and Use Analysis," contains baseline water-supply data and baseline and projected water withdrawal and water-consumption data used for the assessment. Also included are a water adequacy analysis, a natural flow analysis, and a critical-month analysis.

ABSTRACT

Accession Number:
@ 813.5
U.S. Water Resources Council, Dec. 1978, The nation's water resources, 1975-2000: v. 3: Analytical data, Appendix III, Monthly water supply and use analysis: Second National Water Assessment, Washington, D.C.

Contact: U.S. Government Printing Office (copy)

Key Categories: COLORADO, WYOMING, UTAH, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 01

The Water Resources Planning Act of 1965 (Public Law 89-80) directs the U.S. Water Resources Council (WRC) to maintain a continuing study of the Nation's water and related land resources and to prepare periodic assessments to determine the adequacy of these resources to meet present and future water requirements. In 1968, the WRC reported the results of its initial assessment. The Second National Assessment, a decade later, provides a comprehensive nationally consistent data base for the water resources of the United States.

The final report consists of four separate volumes. Appendix III of Volume 3, "Monthly Water Supply and Use Analysis," contains monthly details of the water-supply, water-withdrawal, and water-consumption data contained in Appendix II and includes an analysis of monthly water adequacy.

ABSTRACT

Accession Number:
@ 813.6
U.S. Water Resources Council, Dec. 1978, The nation's water resources, 1975-2000: v. 3: Analytical data, Appendix IV, Dry-year conditions water supply and use analysis: Second National Water Assessment, Washington, D.C., 337 p.

Contact: U.S. Government Printing Office (copy)
Colorado Water Conservation Board (copy)

Key Categories: COLORADO, WYOMING, UTAH, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 011 Use Code: 01

The Water Resources Planning Act of 1965 (Public Law 89-80) directs the U.S. Water Resources Council (WRC) to maintain a continuing study of the Nation's water and related land resources and to prepare periodic assessments to determine the adequacy of these resources to meet present and future water requirements. In 1968, the WRC reported the results of its initial assessment. The Second National Assessment, a decade later, provides a comprehensive nationally consistent data base for the water resources of the United States.

The final report consists of four separate volumes. Appendix IV of Volume 3, "Dry-Year Conditions Water Supply and Use Analysis," contains both annual and monthly baseline and projected water-withdrawal and water-consumption data for dry conditions. Also a dry conditions water-adequacy analysis is included.

ABSTRACT

Accession Number:
@ 813.7
U.S. Water Resources Council, Dec. 1978, The nation's water resources, 1975-2000: v. 3: analytical data, appendix V, streamflow conditions: Second National Water Assessment, Washington, D.C.

Contact: U.S. Government Printing Office (copy)

Key Categories: COLORADO, WYOMING, SURFACE WATER QUANTITY

Access Code: 002 Use Code: 01

The Water Resources Planning Act of 1965 (Public Law 89-80) directs the U.S. Water Resources Council (WRC) to maintain a continuing study of the Nation's water and related land resources and to prepare periodic assessments to determine the adequacy of these resources to meet present and future water requirements. In 1968, the WRC reported the results of its initial assessment. The Second National Water Assessment, a decade later, provides a comprehensive nationally consistent data base for the water resources of the United States.

The final report consists of four separate volumes. Appendix V of Volume 3, Streamflow Conditions, contains detailed background information on the derivation of the baseline streamflow information. A description of streamflow gages used, correction factors applied, periods of record, and extreme flows of record, are given for each subregion. Also included is the State-Regional Future estimate of average streamflow conditions.

ABSTRACT

Accession Number:
@ 813.8
U.S. Water Resources Council, Dec. 1978, The nation's water resources, 1975-2000: v. 4: Upper Colorado Region: Second National Water Assessment, Washington, D.C., 40 p.

Contact: U.S. Government Printing Office (copy)
Colorado Water Conservation Board (copy)

Key Categories: COLORADO, WYOMING, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 011 Use Code: 01

The Water Resources Planning Act of 1965 (Public Law 89-80) directs the U.S. Water Resources Council (WRC) to maintain a continuing study of the Nation's water and related land resources and to prepare periodic assessments to determine the adequacy of these resources to meet present and future water requirements. In 1968, the WRC reported the results of its initial assessment. The Second National Water Assessment, a decade later, provides a comprehensive nationally consistent data base for the water resources of the United States.

The final report consists of four volumes. Volume 4, Water Resources Regional Reports, consists of separately published reports for each of the 21 regions. The volume on the Upper Colorado Region overviews the physiography, the people, and the resources of the region. Generic and site-specific problems are discussed. The generic problems include domestic water use, water for agriculture, water for mineral extraction and energy conservation, control of water quality, and protection of unusual and unique natural areas. Individual problems discussed focus on the Green River in Wyoming, the Yampa and White Rivers in Colorado and Wyoming, the Uinta Basin and the Price and San Rafael rivers in Utah, and the Colorado, Gunnison and Dolores rivers in Colorado.

ABSTRACT

Accession Number:
@ 815
U.S. Water Resources Council, June 1971, Upper Colorado Region comprehensive framework study, appendix V, water resources: (Note: copy available from Water Resources Archives, #G335 K1 App. V).

contact: none

Key Categories: SURFACE WATER QUANTITY, GROUNDWATER QUANTITY

Access Code: @00 Use Code:

ABSTRACT

Accession Number:
@ 815.1
Watson, G.H., and Speer, T.L., Dec. 1978, Slurry backfiling of in-situ oil shale retort: U.S. Patent 4,131,416, 12 p.

Contact: U.S. Patent Office (copy)
2021 Jefferson Davis Hwy, Arlington, Virginia

Key Categories: IN-SITU, RECLAMATION

Access Code: 002 Use Code: 02

Disclosed is a process for the subterranean in situ retorting of oil shale and disposal of spent shale from surface retorting comprising forming a subterranean in situ retort so that the subterranean retort contains a mass of rubblized oil shale; passing a retorting fluid through said rubblized mass so as to substantially retort said mass and recover hydrocarbons; cooling the subterranean retort; introducing a slurry comprising water and spent oil shale from surface retorting into said subterranean retort; and introducing a slurry comprising water and a material capable of forming a porous structure at one or more points in the subterranean retort so as to form one or more drainage paths for the removal of water from the slurry of water and spent shale from surface retorting; so that the spent shale from surface retorting is effectively disposed of and a mechanically and environmentally suitable underground formation is established.

ABSTRACT

Accession Number:
@ 816
Watts, J.C., Dec. 1977, Ground water leaching of in situ retorted oil shale: M.S. Thesis, chemical engineering, Texas Tech. University, Lubbock, Texas.

Contact: Dick Poulson (loan)

Key Categories: LEACHING, IN-SITU

Access Code: 011 Use Code: 03

This thesis summarizes the results of a laboratory investigation of the inorganic materials from simulated in situ spent shales. A small laboratory-scale retort was used to process raw oil shale for varying conditions of temperature, time, and atmosphere. The resulting cores or crushed spent shale were leached with groundwater, and the leachates were analyzed for several major and minor ions. The mineralogical phases in the raw and retorted shale were determined by x-ray diffraction.

ABSTRACT

Accession Number:
@ 816.1
Weand, B.L., May 1978, Water quality changes at in-situ oil shale study sites: report prepared by Wyoming Water Resources Research Institute, Laramie, Wyoming, Laramie Energy Research Center, Laramie, Wyoming.

Contact: Dick Poulson (loan)

Key Categories: EFFLUENTS, LEACHING, IN-SITU, GROUNDWATER QUALITY, WYOMING

Access Code: 002 Use Code: 02

A major concern in the development of in situ oil shale production has been the potentially adverse effects on water quality. The Laramie Energy Research Center (LERC) has monitored water quality at its oil shale research sites near Rock Sprigs, Wy. for the past several years.

The report discusses water quality trends at two field sites and appendices present time plots of B, SO_4, TOC, COD and other parameters and trilinear plots of ionic composition. This report updates the earlier effort for Rock Springs Sites 6 and 9, with consideration of the additional information collected in the interim.

ABSTRACT

Accession Number:
@ 816.2
U.S. Weather Bureau, 1960, Climatic summary of the United States: Bulletin W supplement, 1951-1960, Series 86: U.S. Dept. of Commerce, Washington, D.C.

Contact: National Climatic Center (copy)

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 002 Use Code: 02

This supplement was issued for each State or combination of States. The supplement is an update to previous editions or supplements of the Climatic Summary of the United States. It presents by stations: sequential tables of monthly and annual total precipitation; sequential tables of monthly and annual total snowfall; mean number of days with precipitation equal to or greater than 0.10 and equal to or greater than 0.50 inch; sequential tables of mean monthly and annual temperature; mean daily maximum temperature; mean daily minimum temperature; highest temperature; lowest temperature; mean number of days with temperature equal to or greater than 90°F and equal to or less than 32°F; mean monthly and annual evaporation; and a station index and history. The means and extremes in the tables listed above are for the 10 year period 1951-1960 as well as for the entire period of record through 1960,

Data for stations reporting hourly precipitation are also shown. There are sequential tables by station for total monthly and annual precipitation and a station index and history.

Although there have been no supplements to the Climatic Summary of the United States published since the 1951-1960 edition, sequential tables of monthly and annual values of average maximum, average minimum, and average temperatures and total precipitation have been compiled for the period 1941-1976 for many stations. Also included in these compilations are sequential tables of the monthly and annual highest and lowest observed daily temperatures for the 46 year period 1931-1976. These compilations may not be serially complete; they will be subjected to a further review for accuracy when a new set of climatological normals, based upon the 30 year period 1951-1980, is prepared in 1981. All of these unpublished compilations have been filmed, and can be supplied as paper copy or on microfiche. A list of stations for which these compilations were made is also available from the National Climatic Center, Federal Building, Asheville, NC 28801.

ABSTRACT

Accession Number:
@ 816.3
U.S. Weather Bureau, 1952, Climatic summary of the United States: Bulletin W supplement, 1931-1952, Series 11, U.S. Dept. of Commerce, Washington, D.C.

Contact: National Climatic Center (copy)

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 002 Use Code: 02

This supplement was issued for each state or combination of States. It is a supplement to previous editions of the Climatic Summary of the United States. It presents, by stations, sequential tables of monthly and annual values of total precipitation; and tables showing the mean monthly and annual values of total precipitation; and tables showing the maximum and minimum temperatures, and highest and lowest temperatures. Also included is a "Station Index and History" table which furnishes pertinent non-climatological facts about the stations included in the tabulations. The issue for Alaska contains data for the period 1922 through 1952; the issue for Hawaii contains data for the period 1919 through 1952.

ABSTRACT

Accession Number:
@ 816.4
U.S. Weather Bureau, 1930, Climatic summary of the United States Bulletin W. sections 12-14 and 20-24, climatography of the United States, Series 10: U.S. Dept. of Commerce, Washington, D.C.

Contact: National Climatic Center (copy)

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 002 Use Code: 02

This summary was issued for each of 105 climatological sections of the U.S. and for Puerto Rico and the U.S. Virgin Islands. Alaska and Hawaii were not included in this edition.

This is the third edition of what is commonly referred to as Bulletin W and which contains basic climatological data for many stations throughout the country. The first issue, titled Summary of Climatological Data for the United States, contains data from the beginning of record through 1908 and 1909. The second edition contained data generally through 1920, although a number of the sections covered varying periods through 1921 to 1923.

Each section of this publication (1930 edition) has a narrative summary of the topographic features and climatic conditions of the section, the latter containing special emphasis on precipitation in general, snowfall, temperature, wind and humidity. Also included are tables presenting data covering varying periods of years through 1930 as follows:

1. Monthly and annual averages and extremes of temperature, precipitation, relative humidity, sunshine, and wind; execssive short-duration precipitation. Also included are monthly and annual values of short-duration maximum precipitation and greatest in 24-hours, miscellaneous data for a few selected stations.

2. Sequential tables of monthly and annual average, average maximum and minimum, and highest and lowest temperatures for a few selected stations; and values of total monthly and annual precipitation for numerous stations.

3. Average monthly and annual snowfall; average number of days with 0.01 inch or more of precipitation; average monthly, average maximum, and average minimum temperatures; highest and lowest temperatures; average relative humidity; percentage of possible sunshine; prevailing wind direction and average hourly speed; maximum wind speed (with direction and date); and frost data for numerous stations.

ABSTRACT

Accession Number:
@ 817
Weatherford, G.D., and Jacoby, G.C., 1975, Impact of energy development on the law of the Colorado River: Natural Resources Journal, Univ. of New Mexico, School of Law, Albuquerque, v. 15, no. 1, p. 171.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, WATER LAW

Access Code: 002 Use Code: 03

In this paper, the authors address the question of whether the "law" of the Colorado River is flexible enough to moderate competing demands on the river in the future, and how the process will work. The present legal framework, hydrologic parameters and prospects, legal considerations of alternative management futures, and the prospect and patterns of institutional change are analyzed. The following conclusion are reached:

> "As long as the flow of the river is variable, a legal formula for allocating hydrological risk will be required. As long as the quality of the river significantly limits economic development, legally enforceable standards for water use practices will be needed.
>
> In broad terms, the problem of managing the Coloado River is the problem of allocating a flow resource in such a way as to satisfy legally preferred current demands without foreclosing the satisfaction of a different set or configuration of demands in the future. When so viewed, it is clear that there will be no single and final solution to the problems of allocation and management in the Colorado River Basin."

ABSTRACT

Accession Number:
@ 818
Weaver, G.D., 1974, Examination of possible environmental impacts of oil shale development on land resources of the Upper Colorado River basin: Journal of Soil and Water Conservation, v. 29, no. 2, p. 73-76.

Contact: Denver Public Library (loan)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 03

Groundwater systems would be especially sensitive to overdraft or disruption of intake areas because of the low rates of natural recharge, i.e., intensive well pumping in the North Piceance Creek Basin, which contains two of the proposed lease tracts, would cause water levels to decline several hundred feet in less that one year. Emplacement of spent shale in the surface environment could result in leaching, vadose percolation, circulating groundwaters, or slurry drainage which would remove large amounts of sodium, calcium, magnesium, and sulfate ions. Salinity levels in streams would increase, and an increase in the salinity pollution of the Colorado main stem would be felt by water users in the lower basin states and Mexico.

ABSTRACT

Accession Number:
@ 819
Weaver, G. D., 1973, Environmental hazards of oil shale development: Ph.D. Dissertation, Johns Hopkins University, 312 p. plus appendices.

Contact: University Microfilms International (copy)

Key Categories: SURFACE WATER QUALITY, SURFACE, IN-SITU, LEACHING, EFFLUENTS, ENVIRONMENTAL, COLORADO, UTAH, AVAILABLE WATER BY BASIN, SUBSIDENCE

Access Code: 011 Use Code: 02

This thesis analyzes the environmental impacts of an oil shale industry based on both surface and in-situ retorting methods. The first half of the document summarizes available information on baseline conditions. Reviews are included on the following topics: mineral resources, climate, vegetation, surface water hydrology and quality, groundwater hydrology and quality, air quality, population and settlement patterns, available water supplies, agricultural land resources, wildlife resources, recreational resources, process technology, and waste effluents. The second half of the document discusses the potential impacts of a surface and an in-situ industry on these aspects of the environment. The following topics are included: subsidence, solid waste disposal, revegetation, and impacts on water yield and quality, on air quality, and on wildlife resources.

ABSTRACT

Accession Number:
@ 819.1
Weber, E.M., Donabedian, C.S., and Tostrud, M.B., 1976, Models applied to salinity projection: in Clyde, C.G., Falkenborg, D.H., and Riley, J.P., eds, Colorado River basin modeling studies, Utah Water Research Laboratory, p. 229-256.

Contact: Utah Water Research Laboratory (copy)

Key Categories: COLORADO, WYOMING, UTAH, SALINITY, COMPUTER MODELS

Access Code: 011 Use Code: 01

A series of salt routing studies were conducted to provide estimates of future salinity levels at selected points in he basin under different assumptions as to both the available water supply and future water use. The studies were designed to provide estimates of salinity conditions with and without salinity control measures during the period 1974 through 1990.

The river network model developed by Richard W. Ribbens, of the Bureau of Reclamation-Engineering and Research Center was used. This model is an accounting system with only limited simulation capabilities. River flow and salinity are routed through the river system using a time frame of one month.

Total dissolved solids (TDS) are used as the quality parameter. Since mass balance concepts are used, such items as chemical precipitation, dissolution and reactions of individual constitutents are not considered but are included by appropriate inputs.

The reservoirs in the system may be operated in a number of ways and may be considered individually or conjunctively.

Program input includes the system configuration (network), reservoir characteristics, storage conditions, evaporation rates, operating criteria, upstream and downstream boundary values, and water use options. Various types of output from the program can be selected, including printed and cathode ray tube plots at various river locations and reservoirs. In addition, initial input data, detailed monthly results and summaries, as well as simple statistics, can be printed.

ABSTRACT

Accession Number:
@ 820
Weeks, J.B., June 1978, Digital model of ground-water flow in the Piceance Basin, Rio Blanco and Garfield Counties, Colorado: U.S. Geological Survey Water-Resources Investigations 78-46.

Contact: Public Inquiries Office (copy)

Key Categories: COMPUTER MODELS, GROUNDWATER QUANTITY, COLORADO

Access Code: 011 Use Code: 01

The digital model used to simulate ground-water flow in the aquifer system in the basin drained by Piceance and Yellow Creeks in northwestern Colorado is described in detail. The model is quasi three-dimensional in that it simulates ground-water flow in a multiaquifer system by assuming horizontal flow in the aquifers and vertical flow through the confining layers separating the aquifers. The model uses the iterative alternating-direction implicit procedure to solve the finite-difference flow equations.

The digital model is documented by a program listing and flow charts. Data used in the model and sample output are presented to document the simulation of steady-state flow in the aquifer system. The variables used in the computer program and program options are discussed in detail

ABSTRACT

Accession Number:
@ 821
Weeks, J.B., Spring-Summer 1976, Ground water problems with oil shale mining in the Piceance Basin: in Water Spectrum, p. 8-14.

Contact: John Weeks (copy)
Denver Public Library (loan)

Key Categories: GROUNDWATER QUALITY, GROUNDWATER QUANTITY, ENVIRONMENTAL, COLORADO

Access Code: 011 Use Code: 02

This summary article overviews the prototype oil shale leasing program and the physical, geologic, and hydrologic features of the Piceance basin. The results of computer modeling studies to evaluate the effects of mine dewatering at tracts C-a abd C-b on the groundwater system are described.

ABSTRACT

Accession Number:
@ 822
Weeks, J.B., 1974, Water resources of Piceance Creek Basin, Colorado: in Murray, D.K., ed., Energy resources of the Piceance Creek Basin, Colorado, 25th Field Conference of the Rocky Mountain Association of Geologists, Denver, Colorado, p. 175-180.

Contact: John Weeks (copy)
USGS Library - Denver (loan)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, COLORADO

Access Code: 011 Use Code: 03

This paper presents a broad overview of water resources of the Piceance Basin, based on literature published prior to 1974. The article overviews surface water and ground water hydrology and quality of the Basin, and it discusses water use.

ABSTRACT

Accession Number:
@ 823
Weeks, J.B., and Welder, F.A., 1974, Hydrologic and geophysical data from the Piceance Basin, Colorado: Colorado Dept. of Natural Resources and the U.S. Geological Survey, Colorado Water Resources Basic-Data Release No. 35, Denver 121 p. & 5 plates.

Contact: USGS Library (loan)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, COLORADO

Access Code: 011 Use Code: 01

Potential oil-shale development and the need for information on the water resources of the Piceance basin led to a cooperative project between the Colorado Department of Natural Resources and the U.S. Geological Survey. The 2-year investigation began in 1972. One of the principal objectives of the study was to provide the data needed to evaluate the effects of future development on the hydrology of the Piceance basin. To meet this objective, all of the basic hydrologic data collected and compiled by the project through December 1972 were published in "Hydrologic Data from the Piceance Basin, Colorado," by John F. Ficke, John B. Weeks, and Frank A. Welder, Colorado Water Resources Basic-Data Release No. 31, and all of the basic data collected between January 1973 and July 1974 are contained in this report (Basic-Data Release No. 35). Basic-Data Releases Nos. 31 and 35 are companion volumes which provide all of the public data collected during the cooperative study. The two reports contain data from 97 wells, 6 springs, and 37 continuing surface-water stations. Miscellaneous measurements of discharge and specific conductance in streams are also contained in both reports. Included in this report are groundwater and surface-water data collected by the U.S. Geological Survey in cooperation with private companies.

ABSTRACT

Accession Number:
@ 824
Weeks, J.B., and others, 1974, Simulated effects of oil shale development on the hydrology of Piceance Basin, Colorado: U.S. Geological Survey Professional Paper 908, 84p & map.

Contact: Public Inquiries Office (copy)

Key Categories: COMPUTER MODELS, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, ENVIRONMENTAL, COLORADO

Access Code: 011 Use Code: 01

The present report is the result of a 2-year investigation of the hydrology of Piceance Creek basin conducted by the U.S. Geological Survey in cooperation with the Colorado Department of Natural Resources. This project was one of four concurrent projects contracted in 1972 by the State of Colorado to investigate the possible effects of oil-shale development on the environment of the Piceance basin.

The basic data collected and reported elsewhere (Ficke and others, 1974; Weeks and Welder, 1974) were used to formulate the description of the hydrologic system and to develop digital models of the system. The models were used to predict the effects of development on the hydrology of the basin. The purpose of this report is to describe the hydrologic system, describe the digital models of the system, and predict the effects of development on the system. The environmental analysis focuses on the effects of open pit mine dewatering of tracts C-a and C-b on the hydrologic system. It was concluded that oil-shale development will have significant effects on the surface and groundwater systems in the Piceance basin.

ABSTRACT

Accession Number:
@ 825
Weichman, B.E., 1974, Depositional history and hydrology of the Green River oil shale, Piceance Creek Basin, Rio Blanco County, Colorado: in Transactions of the Society of Mining Engineers of AIME, v. 256, no. 4, p. 272-277.

Contact: Ben Weichman (copy)

Key Categories: GROUNDWATER QUANTITY, COLORADO

Access Code: 011 Use Code: 02

This paper discusses the geology and hydrology of the Green River Formation of the Piceance Creek Basin, Colorado. The paper focuses on the nahcolite reserves and the hydrology of the leached zone. The environment of deposition of the Parachute Creek Member, over geologic time, is discussed, and the role of fracturing, following deposition, is discussed. The history, formation, geology, and fracturing of the leached zone are reviewed, and the geohydrology of the leached zone is presented. Field data from Superior Oil Co. tests are presented, including a generalized potentiometric surface map and aquifer test results. The effective porosity is estimated, and the volume of water in storage is calculated.

ABSTRACT

Accession Number:
@ 826
Weir, J.E., Jr., 1970, Geohydrology of the area near WOSCO Exploratory Hole No. 1, Uintah County, Utah: U.S. Geological Survey Open-File Rep. USGS-3002-1, 27 p.

Contact: Open-File Services Section (copy)

Key Categories: GROUNDWATER QUANTITY, UTAH

Access Code: 002 Use Code: 02

In order to assess the feasibility of fracturing the oil shale in the central part of the Uinta Basin in Uintah County, Utah by underground explosion of a nuclear device, an exploratory hole (Wosco Exploratory Hole Ex. 1) was drilled during July 1969. Geohydrologic data obtained from this hole, drilled to a depth of 3,234 feet, and other nearby wells are presented along with an interpretation of the data. Jetting tests and a flow test of three water-bearing zones in the Green River formation of Eocene age indicated very low transmissivities and hydraulic heads sufficient to cause flow at the surface. Water from these zones is briny, ranging in concentration from 37,000 to 72,700 milligrams per liter of dissolved solids. If a nuclear explosive is detonated at a depth of 2,370 feet, just below the apparent richest kerogen-bearing part of the oil shale penetrated, fracturing reportedly would not extend downward into the upper water-bearing zone of the Green River formation. Under these conditions, water very likely wil not flow into the rubble chimney made by the nuclear explosion.

ABSTRACT

Accession Number:
@ 827
Weir, J.E., Jr., and Dinwiddie, G.A., 1973, Hydraulic testing accompanying drilling of five exploratory holes, Piceance Creek Basin, Colorado: U.S. Geological Survey Technical Letter USGS-3002-2, 55 p.

Contact: USGS Library (loan)

Key Categories: COLORADO, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 02

The U.S. Geological Survey collaborated with The Oil Shale Corporation (TOSCO) and other participating oil companies in collecting hydrologic information from five exploratory core holes while they were being drilled during the winter of 1971-72. These holes were drilled in the southern part of the Piceance Creek structural basin in Rio Blanco County, Colorado. All five holes (designated TG 71-1 through TG 71-5) penetrated the Mahogany ledge zone of the Parachute Creek Member of the Green River Formation of Eocene age. This report summarizes field data from this study It presents changes in the rate of discharge, temperature, and conductance during drilling, water level recovery data, jettison test results, and hydraulic test data.

General conculsions, based on comparison and evaluation of available date, are that 1) the rocks having greatest permeability penetrated by the five test holes are above the Mahogany ledge zone in the upper part of the Parachute Creek Member of the Green River Formation; 2) groundwater in the penetrated rocks becomes more mineralized with depth, noticeably at and below the Mahogany ledge zone; and 3) the test holes probably are in an area of potential groundwater discharge.

ABSTRACT

Accession Number:
@ 828
Weir, J.E., Jr., 1972, Hydraulic testing and sampling of holes RB-E-01 and RB-D-01, project Rio Blanco, Rio Blanco County, Colorado: U.S. Geological Survey Technical Letter USGS-474-150, 28 p.

Contact: USGS Library (loan)

Key Categories: COLORADO, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 02

The U.S. Geological Survey, at the request of the U.S. Atomic Energy Commission, and in collaboration with CER Geonuclear Corp., monitored the discharge of water during drilling of two holes (RB-E-01 and RB-D-01) at the Rio Blanco site in western Colorado. The reports summarizes the history of drilling, discharge, temperature, and water quality data as a function of depth. It also summarizes the results of water level recovery tests and groundwater velocity and direction determinations.

ABSTRACT

Accession Number:
@ 829
Weisbecker, L.W., May 1972, The impacts of snow enhancement: technology assessment of winter orographic snowpack augmentation in the Upper Colorado River basin Stanford Research Institute, Menlo Park, California.

Contact: DRI (loan)

Key Categories: COLORADO, WYOMING, UTAH, CLIMATE

Access Code: 042 Use Code: 02

In January 1971, the National Science Foundation initiated a contract with Stanford Research Institute to conduct a technology assessment of winter orographic snowpack augmentation (WOSA) in the Upper Colorado River basin. This technology assessment consists of :

- A cost/effectiveness analysis of WOSA based on the current state of the art in snowpack augmentation.
- An estimate of the improvement in costs and benefits that might be achieved within the next five years through improvements in the state of the art of snowpack augmentation.
- An assessment of the impact of snowpack augmentation on the economic, social, and environmental systems in the area of need or use (beneficiary area), the area of origin (target area), and peripheral areas.
- An assessment of public attitudes toward snowpack augmentation, and how they might be improved
- An assessment of the legal and jurisdictional consequences of snowpack augmentation and of potential public policies regarding its implementation.
- A comparison of snowpack augmentation with other alternative means of alleviating water problems in the area of need.

The research results and the conclusions and recommendations for further actions are summarized and discussed in detail in the text of this report.

ABSTRACT

Accession Number:
@ 829.1
Welder, F.A., 1981, Evaluation of deep-well drilling sites, Rio Blanco and Garfield counties: in Water-Resources Investigations of the U.S. Geological Survey in Colorado - fiscal year 1981, U.S. Geological Survey Open-File Report 81-150, p. 89.

Contact: Frank Welder (status)

Key Categories: COLORADO, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 011 Use Code: 01

The purpose of this project is to evaluate the potential of groundwater aquifers below the Green River Formation to supply water for oil shale and other developments. The study is focused on the Missippian limestone formation and may also evaluate the Entrada and Dakota formations. Available geologic and hydrologic data, including oil-well logs, are being evaluated to select a site for exploratory drilling. Maps are being constructed of formation depth, thickness, permeability, storativity, potentiometric surfaces, well yields, and water quality.

ABSTRACT

Accession Number:
@ 830
Welder, F.A., and Saulnier, G.J., Jr., Sept. 1978, Geohydrologic data from twenty-four test holes drilled in the Piceance Basin, Rio Blanco County, Colorado, 1975-1976: U.S. Geological Survey Open-File Report 78-734, 132 p.

Contact: Open-File Services Section (copy)

Key Categories: COLORADO, GROUNDWATER QUALITY, GROUNDWATER QUANTITY

Access Code: 011 Use Code: 01

Twenty-four test holes were drilled in the Piceance basin, northwestern Colorado, to obtain geohydrologic data from the Uinta and Green River Formations of Eocene age. The test holes were drilled by the air-rotary method and completed in stratigraphic intervals above and below the Mahogany zone in the Parachute Creek Member of the Green River Formation. The interval from land surface to the top of the Mahogany zone, which includes the Uinta Formation, was designated as the upper aquifer, and the interval from the base of the Mahogany zone to the base of the permeable section of the Green River Formation was designated as the lower aquifer. Depths of test holes ranged from 640 to 2,800 feet. The maximum quantity of water discharged during the air drilling of individual test holes ranged from 14 to 880 gallons per minute. The specific conductance of water discharged during drilling ranged from 100 to 50,000 micromhos per centimeter at 25 degrees Celsius.

Aquifer tests made during drilling indicate transmissivity at four sites ranged from 100 to 1,600 feet squared per day and the storage coefficient at two sites ranged from 1×10^{-4} to 1.6×10^{-4}. Depths to the static water level ranged from 30 to 695 feet.

Water levels were measured in each test well, and potentiometric maps constructed from these measurements are comparable in configuration and altitude to those previously drawn from composite-head data.

Water samples taken during drilling indicate that, except for water from the Unita Formation, the water in Piceance basin is generally not suited for domestic water supply due to the presence or excessive amounts of certain trace constituents, notable fluoride. The average concentraton of dissolved solids, based on data from the test holes, was 909 milligrams per liter for the Uinta Formation, 828 milligrams per liter for the upper part of the Parachute Creek Member of the Green River Formation, and 3,460 milligrams per liter for the lower part of the Parachute Creek Member.

ABSTRACT

Accession Number:
@ 831
Welder, G.E., 1968, Ground-water reconnaissance of the Green River Basin, Southwestern Wyoming: U.S. Geological Survey Hydrologic Investigations Atlas HA-290, 5 p. plus 2 sheets.

Contact: Public Inquiries Office (copy)

Key Categories: SURFACE WATER QUANTITY, SPRINGS, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, WYOMING

Access Code: 011 Use Code: 01

This report describes the occurrence and quality of groundwater in the Green River structural basin of Wyoming. Some general information concerning surface water has been included because of the close relationship of groundwater to surface water in parts of the basin. The report gives the results of one of several groundwater reconnaissance investigations of large areas in Wyoming that are being conducted in cooperation with the Wyoming State Engineer.

The area of this investigation consists of approximately 10,000 square miles, and includes all of the Green River structural basin, which is about 60 percent of the Wyoming part of the Green River drainage basin. It does not include the Wyoming thrust belt along the western side of the drainage basin, nor the Rock Springs uplift, the Washakie Basin, and the Sierra Madre uplift in the eastern part of the drainage basin. Almost all of Sublette County and substantial parts of Lincoln, Sweetwater, and Uinta Counties are in the area studied.

The atlas describes the geology and hydrology, water quality, and use of groundwater in the Green River basin. Sheet 1 of this atlas is a geologic map which shows the location of a number of wells and springs in the basin. Sheet 2 presents chemical analyses for the approximately 90 wells and springs plotted on Sheet 1. It also contains a generalized section of the geologic formations which describes the lithology and rock distributions and possible occurrences of groundwater for each subdivision. Sheet 2 also contains three maps that graphically display information on areal distribution of specific conductance of groundwaters; stream flows, reservoir capacities, and irrigated lands; and the configuration of the water table.

ABSTRACT

Accession Number:
@ 832
Welder, G.E., and McGreevy, L.J., 1966, Groundwater reconnaissance of the Great Divide and Washakie basins and some adjacent areas, southwestern Wyoming: U.S. Geological Survey Hydrologic Investigations Atlas HA-219, 10 p. plus 3 sheets.

Contact: Public Inquiries Office (copy)

Key Categories: GROUNDWATER QUANTITY, GROUNDWATER QUALITY, WYOMING, SPRINGS

Access Code: 011 Use Code: 01

This report describes the results of one of several ground-water reconnaissance investigations of large areas in Wyoming that are being conducted in cooperation with the Wyoming State Engineer. Each area generally coincides with one or more structural features that are relatively independent ground-water systems. The purpose of these surveys is to obtain a general knowledge of ground-water in previously unstudied parts of the State in order to locate potential water supplies for possible future development.

The described area, which is about 10,500 square miles, is in parts of Sweetwater, Carbon, and Fremont Counties of southwestern Wyoming.

The atlas describes the geology and hydrology, water quality, and use of groundwater in the Great Divide and Washakie Basins. Sheet 1 of this atlas is a geologic map showing generalized structure contours and geologic sections. Sheet 2 is a hydrologic map showing generalized piezometric contours in the Great Divide Basin, specific conductance of groundwater, and spring and well locations. Chemical analyses of some 70 wells and springs are also summarized on this sheet. Sheet 3 is a genealized section of the geologic formations which describes the lithology and rock distributions and possible occurrences of groundwater for each subdivision.

ABSTRACT

Accession Number:
@ 832.1
Wen, C.S., 1978, Aerobic treatment of oil shale retort water with mutant species: American Chemical Society, Division of Environmental Chemistry Preprints, v. 18, no. 1, 106-109 p.

Contact: Dave Yen (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 002 Use Code: 03

Two types of retort water from in-situ oil shale processes were treated with activated sludge from the Hyperion Treatment Plant (Los Angeles) along with a 50:50 mixture of the mutant species Phenobac and Polybac. A diluted 25% retort water, with total organic carbon (TOC) at 1500 to 2000 ppM, gave the best result of 68% reduction in TOC, whereas undiluted retort water showed a 62% reduction in TOC. A TOC reduction of 50% was obtained for activated sludge treatment without mutant bacteria. Thus, an increase of TOC reduction was achieved by adding mutant species with activated sludge. This may be due to the mutant biodegradation of some refractory organics which were originally nonbiodegraded by sludge. When mutant species were added on the 1st, 9th, and 16th day, a slightly lower reduction in TOC was observed than when the mutant species were added all at once.

ABSTRACT

Accession Number:
@ 833
Wen, C.S., Yen, T.F., Knight, J.B. and Poulson, R.E., 1976, Studies of soluble organics in simulated in situ oil shale retort water by electron impact and chemical ionization from a combined gas chromatograph-mass spectrometer system: American Chemical Society, Division of Fuel Chemistry, Preprints, v. 21, no. 6, p. 290.

Contact: Dave Yen (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 02

This paper presents the results of analyses of organic compounds present in simulated in-situ retort waters from the Laramie Energy Technology Center experimental retorts. They found that retort water contains complex polar fractions consisting of maleimides, succinidides, and alkoxypyrrolines.

ABSTRACT

Accession Number:
@ 834
Wen, C.S., and Yen, T.F., 1977, Purification and recovery of economic materials from oil shale retort water by an electrolytic treatment process: in Proceedings of the Second Pacific Chemical Engineering Congress, v. I, American Institute of Chemical Engineers, New York, New York, p. 473.

Contact: Dave Yen (copy)
AIChE (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 03

As a result of electrolytic treatment of oil shale retort water, over 40% of the total solid residue and 80% of the benzene-soluble compounds were eliminated. Efficiency of this treatment is further supported by 65% reduction of COD value and 92% reduction of the color intensity. The treatment of a simulated, synthetic retort water is equally effective as the acidic fraction from oil shale retort water in the removal of organic nitrogen and sulfur compounds. Recovery of ammonia and carbon dioxide through the process may provide an economic basic for the synthesis of urea and other valuable products. Microorganisms grow uninhibited in treated retort water.

Electrolysis is a feasible method for treatment of oil shale retort water.

ABSTRACT

Accession Number:
@ 835
Wentz, D.A., and Steele, T.D., 1980, Analysis of stream quality in the Yampa River basin, Colorado and Wyoming: U.S. Geological Survey Water-Resources Investigations 80-8, 161 p.

Contact: Public Inquiries Office (copy)

Key Categories: SURFACE WATER QUALITY, WYOMING, COLORADO

Access Code: 011 Use Code: 01

Historic data show no significant water-temperature changes since 1951 for the Little Snake River or the Yampa River, the two major streams of the Yampa River basin. Regional analyses indicate that harmonic-mean temperature is negatively correlated with altitude, thus allowing stream temperatures to be estimated at unmeasured sites in the basin. No change in specific conductance since 1951 was noted for the Little Snake River; however, specific conductance in the Yampa River has increased 14 percent since that time and is attributed to increased agricultural and municipal use of water. Site-specific relationships between major inorganic constituents and specific conductance for the Little Snake and the Yampa Rivers were similar to regional relationships developed for the entire basin from both historic and recent (1975) data. These relationships provide a means for estimating concentrations of major inorganic constituents from specific conductance, which is easily measured.

Trace-element and nutrient data collected from August 1975 through September 1976 at 92 sites in the Yampa River basin indicate that water-quality degradation occurred upstream from 3 sites. The degradation resulted from underground drainage from pyritic materials that probably are associated with coal at one site, discharge from powerplant cooling-tower blowdown water at a second site, and runoff from a small watershed containing a gas field at the third site. In the latter instance, it is not known if the effect was natural or man-induced. Although not critical problems, ambient concentrations of dissolved and total iron and manganese frequently exceeded proposed Colorado water-quality standards. The concentrations of many dissolved and total trace elements and nutrients were greatest during March 1976. These trace-element and nutrient concentrations were associated with relatively larger suspended-sediment concentrations and relatively smaller pH values than occurred at other times of the year. Seasonal fluctuations in specific conductance were controlled primarily by and were inversely related to stream discharge.

ABSTRACT

Accession Number:
@ 836
Wentz, D.A., and Steele, T.D., 1978, Surface water quality in the Yampa River basin, Colorado and Wyoming - an area of accelerated coal development: in Karadi, G.M., and Krizek, R.J., eds., Water for energy development, Engineering Foundation, Asilomar Conference Grounds, Pacific Grove, Calif., December 5-10, 1976, p. 56.

Contact: none

Key Categories: WYOMING, COLORADO, SURFACE WATER QUALITY

Access Code: 182 Use Code: 02

A 2½-year project designed to evaluate the impacts of energy-resource development on the water resources of the Yampa River basin currently is underway. The various basin-assessment investigations are described in two work-plan reports (Steele and others, 1976a; 1976b).

The present paper describes ambient stream-quality conditions in the basin. Details of the abbreviated results given herein are contained in an expanded technical report currently being prepared by D. A. Wentz and T. D. Steele (written commun., 1976). Historical data have been evaluated, and complementary basin-assessment investigations have been implemented to determine water-quality implications of the proposed alternative coal-development plans. These complementary investigations include a basinwide reconnaissance of 85 stream sites (fig. 1) during low-flow conditions in the last week of August and the first week of September 1975 (Steele and others, 1976a). Three of the sites--Y-3, Y-5, and Y-38A--were dry. Streamflow, temperature, pH, dissolved oxygen, and specific conductance were measured in the field at the remaining 82 sites. Laboratory analyses of other physical, chemical, and biological variables were performed as discussed under individual sections of this paper. The data from the basinwide reconnaissance have been tabulated in a basic-data report by T. F. Giles and R. E. Brogden (written commun., 1976). Details regarding data-analysis techniques are given in the expanded technical report.

ABSTRACT

Accession Number:
@ 837
Wentz, D.A., 1974, Effect of mine drainage on the quality of streams in Colorado, 1971-72: U.S. Geological Survey in cooperation with the Colorado Water Pollution Control Commission, Colorado Water Conservation Board, Colorado Water Resources Circular No. 21, 117 p.

Contact: USGS Library (loan)

Key Categories: SURFACE WATER QUALITY, ENVIRONMENTAL, EFFLUENTS, COLORADO

Access Code: 182 Use Code: 03

Most of the metal deposits in Colorado are predominantly complex ore, a mixture of copper, lead, zinc, and silver sulfides, and native gold. Pyrite (FeS_2) associated with this complex ore oxidizes to yield acid water containing high concentrations of iron and sulfate; this water is commonly known as mine drainage. The oxidation of the other metal sulfides under acid conditions releases high concentrations of trace elements to the water, but no additional acidity. Because Colorado presently has no trace-element standards for waters classed as cold-water fisheries, criteria that might be used by State agencies in developing standards are presented.

Field observations of temperature, specific conductance, pH, stream-bottom conditions, and aquatic biota at 995 stream sites in Colorado during 1971-72 were used as a guide in collecting 192 samples for analysis of sulfate and dissolved trace elements. These data and additional data to be published in a subsequent report indicate that approximately 450 miles (724 kilometers) of streams in 25 different areas are adversely affected by metal-mine drainage. Coal-mine drainage is not a problem, apparently because of the low sulfur content of Colorado's coal.

Manganese, selenium, and sulfate concentrations, and specific conductance appear to be poor indicators of mine drainage because natural sources can cause the values of these parameters to be high even in relatively undisturbed areas. Of the trace elements for which the U.S. Public Health Service (1962, 1970) has established drinking water standards, cadmium exceeds its limit in more than 12 percent of the samples, while arsenic and lead exceed their limits in only 1-3 percent of the samples. Mercury and silver standards are not surpassed; chromium was not detected. Copper and zinc appear to present the greatest danger insofar as toxicity to resident aquatic life is concerned. Acid production is less of a problem in Colorado streams draining metal-mining areas than in streams draining the coal-mining areas of Appalachia.

ABSTRACT

Accession Number:
@ 837.1
Western Energy and Land Use Team, 1981, Statement of work, water resources analysis project: U.S. Fish and Wildlife Service, Fort Collins, CO.

Contact: Clair Stalnaker (status)

Key Categories: COLORADO, WYOMING, UTAH, COMPUTER MODELS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY

Access Code: 011 Use Code: 01

The purpose of this continuing program is to develop an interactive computer-based stream system-habitat model of the Upper Colorado River Basin. The resulting model will consist of three separate computer models: a water routing model, a temperature model, and a physical stream-habitat model. Several papers have been published on preliminary work on these models, and they are abstracted elsewhere: Grenney and Kraszewski, 1981; Milhous, 1981; Theurer, 1982; Theurer and Voos, 1981; Prewitt, Voos and Waddle, 1981. The water routing model uses a mass balance approach, and it does not operate reservoirs. It is a simplified version of the U.S. Bureau of Reclamation CRSS model. The instream temperature model uses climatological and flow data to determine average, maximum, and minimum temperatures at specified points in a system for daily time steps. The stream habitat model integrates the components from the other two models, adding reservoir capacity and water use demands.

The project objectives will be accomplished in three phases over three years, ending in April 1983. In phase I, a basic main-stem balance model shall be developed. Emphasis in this phase shall be placed on modeling habitat-streamflow relationships while accounting for interstate compact flow requirements and water rights within the respective states of the UCRB. In phase II, the model shall be generalized to a form that allows inexpensive addition of tributaries and projects to the stream network and transfer to other basins by altering input data or calling other subroutines. Additionally, the Yampa and White Rivers shall be added to the model by expanding the data set while on-going transfer of the main phase one model to users will be performed. Phase III shall include addition of the Gunnison and Dolores Rivers and continuing transfer activities of the phase two and later products to the model users.

ABSTRACT

Accession Number:
@ 838
Western States Water Council, 1974, Western states water requirements for energy development to 1990: Salt Lake City, Utah.

Contact: none

Key Categories: COLORADO, WYOMING, UTAH, PRESENT WATER USE, PROCESS WATER USE

Access Code: 002 Use Code: 02

This report has been prepared by the Water Resources Committee of the Western States Water Council with the assistance of consultants and the staff of the Western States Water Council. It was prepared to help the Western States, individually and collectively, assess the potential demands for water related to the development of western energy resources. It is not intended that this effort be considered as an energy study. The report draws freely on existing energy studies as a base for energy demands and existing data were supplemented or updated only as it appeared necessary in response to changing needs and plans in the energy resource field.

This report focuses on the water for energy needs only to 1990. This time frame is due in part to the declaration of the federal government of its intentions to become much more energy self sufficient during the next decade. This federal effort is commonly known as "Project Independence." Therefore, in a time sense, this report is limited. It is recognized that the projections for energy demands and the associated water needs will expand in the decades that follow 1990, but this report does not predict, estimate or identify these longer range needs.

The study is limited to the water needed for energy resource development in the eleven Western States that are members of the Western States Water Council. The Western States Water Council is an organization created by the Western Governors Conference in 1965. Council members, as appointed by the Governors, represent the States of Arizona, California, Colorado, Idaho, Montana, New Mexico, Nevada, Oregon, Utah, Washington, and Wyoming.

ABSTRACT

Accession Number:
@ 840
Whitaker, G.L., 1971, Periodic water- and air-temperature records for Utah streams, 1966-1970: U.S. Geological Survey Open-File Report (also published as Utah Basic-Data Release 22.) 423 p.

Contact: USGS - Salt Lake City (copy)

Key Categories: UTAH, SURFACE WATER QUALITY, CLIMATE

Access Code: 011 Use Code: 01

This report summarizes the periodic water and air temperatures that have been recorded in Utah since 1967. A compilation of all daily water-temperature records recorded for streams in Utah by the U.S. Geological Survey during the period 1944-68 is contained in Utah Basic-Data Release No. 19 (Abstract No. 841).

The temperatures are tabulated in chronological order by gaging-station location. Data are included for all air and water temperatures recorded on a periodic basis through September 30, 1970. The list of temperatures for each station is preceeded by a brief description giving information relating to the site, periods of data collection, and extremes of data. The extremes pertain only to the data contained herein, and are not inclusive of extremes shown in other reports.

ABSTRACT

Accession Number:
@ 841
Whitaker, G.L., 1970, Daily water-temperature records for Utah
streams, 1944-68: U.S. Geological Survey Open-File Report
(duplicated as Utah Basic-Data Release 19), 119 p.

Contact: USGS - Salt Lake City (copy)

Key Categories: SURFACE WATER QUALITY, UTAH, WYOMING

Access Code: 192 Use Code: 01

The purpose of this report is to summarize in tabular form the water-temperature data that have been collected by the U.S. Geological Survey on a daily basis for streams in Utah. A few stream sites near the boundaries of Utah in neighboring States have been included. These sites are on streams which either flow out of or into Utah, and they may provide information of value in studies dealing with water quality in the State.

ABSTRACT

Accession Number:
@ 842
Whitaker, G.L., 1969, Summary of maximum discharges in Utah streams:
Utah Dept. of Natural Resources, Division of Water Rights Technical
Publication 21, 42 p.

Contact: Utah Division of Water Rights (loan)

Key Categories: UTAH, SURFACE WATER QUANTITY

Access Code: 192 Use Code: 01

Maximum discharges determined at regular continuous-record stations, at crest-stage stations, and at miscellaneous sites in or near the borders of Utah through September 1967 are compiled in tables of this report. The data are presented separately for the Colorado River Basin and for the Great Basin and are summarized in graphs. Some conclusions are drawn, and based on available data, figures representing the maximum floods of record are presented both in the graphs and in tabular form.

ABSTRACT

Accession Number:
@ 842.1
White, I.L., Chartock, M.A., Leonard, R.L., Ballard, S.C., and Gilliland, M.W., March 1979, Energy from the West: impact analysis report, v. II: site-specific and regional impact analysis: final report, July 1975-October 1979: University of Oklahoma, Norman, Oklahoma, Rep. PB-80-113574, 991 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 02

This document reports the results of impact analyses conducted as a part of a three-year technology assessment of the development of six energy resources (coal, geothermal, natural gas, oil, oil shale and uranium) in eight western states (Arizona, Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah and Wyoming) during the period 1975-2000. In Volume II, six chapters report on the analysis of the likely impacts of deploying typical energy resource development technologies at sites representative of the kinds of conditions likely to be encountered in the eight-state study area. A seventh chapter describes other local impacts which might occur; and a final chapter reports the results of regional impacts.

ABSTRACT

Accession Number:
@ 842.2
White, I.L., Chartock, M.A., Leonard, R.L., Ballard, S.C., and
Gilliland, M.W., March 1979, Energy from the West: impact analysis
report, v. 1: final report, July 1975-Oct. 1979, University of
Oklahoma, Norman, Oklahoma, Rep. PB-80-113566, 185 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 02

This document reports the results of impact analyses conducted as a part of a three-year technology assessment of the development of six energy resources (coal, geothermal, natural gas, oil, oil shale and uranium) in eight western states (Arizona, Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah and Wyoming) during the period 1975-2000. Volume I describes the purpose and conduct of the study and summarizes both site-specific and regional impact analysis results.

ABSTRACT

Accession Number:
@ 842.3
White, I.L., and others, July 1977, Energy from the West: a progress report of a technology assessment of Western energy development, v. III-preliminary policy analysis: Rep. EPA-600/7-77-072C, 176 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 02

This study is one part of four volume progress report. The study area includes Arizona, Colorado, New Mexico, Montana, North Dakota, South Dakota, Utah, and Wyoming. The energy resources evaluated include coal, geothermal, natural gas, oil, oil shale, and uranium. The time frame extends from the present to the year 2000. This volume represents a first step in the identification, evaluation, and comparison of alternative policies and implementation strategies. The history of the U.S. Energy policy system is reviewed, some major public and private sector participants are identified, and four energy policy subsystems are discussed. The principal problems and issues that public policymakers will be called on to resolve are discussed. Selected alternative policies are described, but a comprehensive evaluation of alternatives is left for the final report. The problems and issues singled out for attention are: water availability and quality; community services and facilities; air quality; Indians; and reclamation. Volume I provides a general description of the assessment results. Volume II presents more detailed analytical results on a site specific and regional basis. Volume IV contains two technical appendices, one covering alternative approaches to modeling air quality in areas with complex terrain, and one on energy transportation cost comparisons.

ABSTRACT

Accession Number:
@ 842.4
White, I.L., and others, July 1977, Energy from the West: a progress report of a technolgy assessment of Western energy resource development, v. II-detailed analyses and supporting materials: Rep. EPA-600/7-77-0726, 960 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 02

This study is one part of a four volume progress report of a technology assessment of Western Energy Resources Development. The study area includes Arizona, Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah and Wyoming. The energy resources evaluated include coal, oil, oil shale, geothermal, natural gas, and uranium. The time frame extends from the present to the year 2000. The likely impacts of deploying typical energy resource development technologies at sites representative of the kinds of conditions likely to be encountered in the eight state study area are analyzed. The impacts likely to occur if Western enery resources are developed at three different levels of intensity are also analyzed. Site specific analyses are presented including the following area: Kaiparowits/Escalante, UT; Rifle, CO; and Gillette, WY; site specific air, water, socio-economic, and ecological impacts are discussed. A regional analysis was also conducted in which transportation, health, noise and aesthetic impacts are evaluated. Volume I provides a general description of the assessment results; volume III represents a first step in the identification, evaluation and comparison of alternative policies and implementation strategies; volume IV contains two technical appendices, one covering alternative approaches to modeling air quality in areas with complex terrain, and one on energy transportation cost comparisons.

ABSTRACT

Accession Number:
@ 842.5
White, I.L., and others, June 1977, Energy from the West: a progress report of a technology assessment of Western energy resource development, v. I-summary report: Rep. EPA-600/7-77-072A, 153 p.

Contact: NTIS (copy)

Key Categories: COLORADO, WYOMING, UTAH, ENVIRONMENTAL

Access Code: 002 Use Code: 02

This four volume study constitutes a progress report of a three year technology assessment (TA) of the development of coal, geothermal, natural gas, oil, oil shale and uranium resources. The study area includes Arizona, Colorado, Montana, North Dakota, New Mexico, South Dakota, Utah and Wyoming. The time frame extends from the present to the year 2000. The program's purpose is to identify economically, environmentally, and socially acceptable energy development alternatives. The TA identifies and analyzes a broad range of consequences of energy resource development in the Western U.S. it evaluates and compares alternative courses of action for enhancing desirable consequences and mitigating or elimating undesirable ones. The general description of the TA results found in this volume include: a description of the context and methodological framework; a summary description of the impact analysis; a summary of some policy implications of these results, although the TA is in the early stages of policy analysis; and a description of what the second phase of the project will entail. Volume II contains site-specific analyses; volume III details alternative policies and implementation strategies; volume IV discusses air quality modeling alternatives and cost comparison of energy transporation costs.

ABSTRACT

Accession Number:
@ 843
White, J.D., 1978, Technical and environmental aspects of oil shale processing: Ph.D. Thesis, University of California, Los Angeles, 296 p.

Contact: University Microfilms International (copy)

Key Categories: COLORADO, ENVIRONMENTAL

Access Code: 011 Use Code: 02

This study was conducted to evaluate and document the major technical and environmental aspects of the oil shale technologies currently being considered for application to United States oil shale deposits. Oil shale processing techniques were divided into three categories: aboveground or surface retorting; modified in situ retorting; and true in situ retorting techniques. The candidate oil shale technologies within each of these categories were identified and described. A representative retorting technology from each category was selected for a detailed technical analysis as an example of the current state-of-the-art. The analysis included a thorough description of process operations, a technical evaluation of the process, and a scenario of a commercial scale operation using the retorting technology selected for analysis. Based on the scenario, the environmental aspects of commercial scale development activities were presented. The principal environmental impacts of aboveground oil shale processing were identified and include air emission from the retorting and upgrading facility and land disturbance from the disposal of large volumes of retorted shale. The principal environmental impacts of modified in situ oil shale processing were identified, and include regional groundwater comtamination resulting from groundwater influx into spent in situ retorts, and large-scale land subsidence due to overburden collapse into spent retorts. The principal environmental issues of concern to true in situ processing were identified, and include disposal problems associated with large volumes of retort off-gas and product water, and surface activities resulting in land disturbance over large areas. Generic environmental issues applicable to all oil shale processing techniques include ecological effects of large scale land disruption, potential health risks to oil shale industry workers, and socio-economic impacts to communities in the oil shale region.

ABSTRACT

Accession Number:
@ 844
White River Shale Project, Aug. 1981, Detailed development plan, oil shale Tracts U-a and U-b v. 1: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: PROCESS WATER USE, RECLAMATION, EFFLUENTS, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SPRINGS, CLIMATE, UTAH

Access Code: 011 Use Code: 01

This is Volume 1 of the two-volume Detailed Development Plan (DDP) for lease tracts U-a and U-b submitted under the Federal Prototype Oil Shale Leasing Program. This DDP replaces an earlier one, submitted in 1976. This earlier document was a candidate for approval when the federal lease was suspended. This DDP is very similar to the earlier one, except it updates the information on retorting processing and environmental candidates.

These two volumes describe the baseline conditions and proposed development plans, including exploratory, development, production, processing and reclamation operations and environmental compliance plans for these tracts. The proposed commercial facility will consist of underground mining and one 13,000 tons per stream day (TPSD) Superior retort, four 11,600 TPSD Union B retorts, four 25,000 TPSD Superior retorts, and two 9,700 TPSD TOSCO II retorts. On-site upgrading is planned and about 106,300 barrels per stream day of refined products will be transported off site by pipeline.

Volume 1 of this DDP consists of three sections, an introduction, a description of the project area, and a description of the proposed action. The introduction provides a general outline of the DDP it discusses issuance of the leases and the White River Shale Project, and it overviews exploration and baseline data collection. Section 2 is a summary of the Final Environmental Baseline Report (Abstract No. 851). Section 3 describes the plan for the project from its inception through all of its development and operation stages through decommissioning. This later section includes a discussion of water supply development, process water use, and wastewater treatment, and it includes detailed water balances for the proposed project.

ABSTRACT

Accession Number:
@ 845
White River Shale Project, Aug. 1981, Detailed development plan, oil shale Tracts U-a and U-b v. 2: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: RECLAMATION, EFFLUENTS, ENVIRONMENTAL, SURFACE, UTAH

Access Code: 011 Use Code: 01

This is Volume 2 of the detailed development plan for lease tracts U-a and U-b. This volume presents the planned environmental protection procedures, environmental effects of the proposed action after mitigation, the monitoring program, and alternatives and selection rational. The proposed commercial facility is described in Abstract No. 844.

The environmental protection section contains the plans and procedures proposed to reduce and mitigate the environmental impacts of the project. It includes more detailed descriptions of pollution control systems introduction in Volume 1 (Abstract No. 844), plans to rehabilitate, preserve, or manage environmental resources, and plans for the prevention or control of fire, accidental spills, and hazards to public health and safety. The effects section discusses the potential project impacts on each of the six environmental resources -- water, air biological, soils and geology, historic and scientific, and aesthetic -- and briefly touches on the environmental effects of decommissioning and abandonment. The analyses are predicated on the implementation and normal operation of all pollution control systems and environmental protection plans. The monitoring section describes the program that will be carried out as an extension to the baseline monitoring program. The selection section describes various alternatives to the proposed plan described in Volume 1 and outlines reasons for choosing the preferred plan.

ABSTRACT

Accession Number:
@ 846
White River Shale Oil Project, Aug. 1981, Progress report environmental programs - 1980, leases U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, SEDIMENT, CLIMATE, UTAH

Access Code: 011 Use Code: 01

This is the fourth report submitted under the Interim Monitoring Program, and it summarizes and interprets data on water resources (surface water, bedrock and alluvial aquifers, and precipitation/evaporation), on air resources (quality and meterology) and on biological resources. The water resources data are from the period October 1, 1979 - September 30, 1980, and other data are from the period January 1, 1980 - December 31, 1980. This report includes data on streamflow, suspended sediment, and water quality at locations on the White River, Evacuation Creek, and at the mouth of Southam Canyon. Streamflow data are also presented for stations at the mouths of Hell's Hole Canyon and Asphalt Wash. The Bird's Nest and Upper aquifers were continuously monitored for water level fluctuations. Additional water level measurements were collected for area correlation. Alluvial aquifers were monitored for water levels and water quality at locations downstream of the tracts on the White River and at the mouth of Southam Canyon. Precipitation and evaporation were monitored at the proposed plant site, in Southam Canyon, and in the surrounding area. The report includes various hydrographs, time plots of daily and/or monthly water quality, and tabular summaries of quality and quantity data.

ABSTRACT

Accession Number:
@ 847
White River Shale Oil Project, Sept. 1980, Progress report, environmental programs - 1979, leases U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, UTAH

Access Code: 011 Use Code: 01

This is the third report submitted under the interim Monitoring Program, and it summarizes and interprets data on water resources (surface water, bedrock and alluvial aquifers, and precipitation/evaporation), on air resources (quality and meterology) and on biological resources. The water resources data are from the period October 1, 1978 - September 30, 1979, and other data are from the period January 1, 1979 - December 21, 1979. The surface water section includes continuous hydrographs for four wells, a piezometric surface map of the tract vicinity, and tabular summaries of well water quality. The air section includes measurements of criteria pollutants, of wind speed and direction, of temperature, relative humidity and other parameters.

ABSTRACT

Accession Number:
@ 848
White River Shale Oil Co., July 1979, Progress report, environmental programs - 1978, leases U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, UTAH

Access Code: 132 Use Code: 01

This is the second report submitted under the Interim Monitoring Program, and it summarizes and interprets data on water resources (surface water, bedrock and alluvial aquifers, and precipitation/evaporation), on air resources (quality and meterology) and on biological resources. The water resources data are from the period October 1, 1977 - September 30, 1978, and other data are from the period January 1, 1978 - December 31, 1978. This report includes data on streamflow, suspended sediment, and water quality at locations on the White River, Evacuation Creek, and at the mouth of Southam Canyon. Streamflow data are also presented for stations at the mouths of Hell's Hole Canyon and Asphalt Wash. The Bird's Nest and Upper aquifers were continuously monitored for water level fluctuations. Additional water level measurements were collected for area correlation. Alluvial aquifers were monitored for water levels and water quality at locations downstream of the tracts on the White River and Evacuation Creek and at the mouth of Southam Canyon, Hell's Hole Canyon, and Asphalt Wash. Precipitation and evaporation were monitored at the proposed plant site, in Southam Canyon, and in the surrounding area. The report includes various hydrographs, time plots of daily and/or monthly water quality and tabular summaries of quality and quantity data.

ABSTRACT

Accession Number:
@ 849
White River Shale Oil Co., Jan. 1979, Supplemental report, environmental programs - 1977, leases U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program, 54 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, UTAH

Access Code: 011 Use Code: 02

This report supplements water resources data presented in the first Interim Environmental Monitoring Report covering the 1977 water year. When the first interim report was published, some of the USGS data were not available. These data and analyses of them are presented in this volume. Additional analyses of other data in the first interim report on surface water, alluvial groundwater and precipitation/evaporation are also included here.

ABSTRACT

Accession Number:
@ 850
White River Shale Oil Co., July 1978, Progress report, environmental programs - 1977, leases U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, UTAH

Access Code: 132 Use Code: 02

This is the first report submitted under the Interim Monitoring Program and it summarizes and interprets data on water resources (surface water, bedrock and alluvial aquifers, and precipitation/evaporation), on air resources (quality and meteorology) and on biological resources. The water resources data are from the period October 1, 1976 - September 30, 1979 and other data are from the period January 1, 1979 - December 31, 1977. This report includes data on streamflow, suspended sediment, and water quality at locations on the White River, Evacuation Creek, and at the mouths of Southam Canyon, Asphalt Wash and Hells Hole Canyon. The Bird's Nest and Douglas Creek bedrock aquifers were continuously monitored for water level fluctuations. Additional water level measurements were collected for area correlation. Alluvial aquifers were monitored for water levels and water quality at locations downstream of the tracts on the White River and Evacuation Creek and at the mouths of Southam Canyon, Asphalt Wash and Hells Hole Canyon. Precipitation and evaporation were monitored at the proposed plant site, in Southam Canyon, and in the surrounding area. The report includes various hydrographs, time plots of daily and/or monthly water quality and tabular summaries of quality and quantity data.

ABSTRACT

Accession Number:
@ 851
White River Shale Project, 1977, Final environmental baseline report, tracts U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: CLIMATE, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, SPRINGS, UTAH, REVEGETATION, SURFACE,

Access Code: 011 Use Code: 01

This is the Final Environmental Baseline Report for tracts U-a and U-b. The detailed data collected under this program are on file in the Area Oil Shale Supervisor's Office in Grand Junction, Colorado, and it was discussed in nine summary reports (Abstract Nos. 855, 859, 856, 852, 857, 858, 860, 861).

This report summarizes the findings from the beginning of each baseline monitoring program elements to completion of 24 consecutive months of monitoring. All the monitoring periods were conducted within the period October 1974 through January 1977. This report emphasizes the results of the last half of the monitoring program, although data are presented from both years, and conclusions are drawn from the findings of the entire program. The work from the first half of the program was reported extensively in the First Year Environmental Baseline Report (Abstract No. 853). It is intended, therefore, that this report and the First Year Environmental Baseline Report be used together in reviewing the two-year environmental program.

The elements of the baseline study are water resources, air resources, biological resources, soils and geology, cultural and paleontological resources, aesthetics, an revegetation of disturbed areas. This report includes the objectives of each element. It also discusses the methodologies used, the results of each program element, interpretation and conclusions of significant findings encountered during the course of the study, and the parameters or species that were found to be indicators of variations between seasons or years and that could be monitored to assess development-related effects on the environment. Each section contains a glossary of terms, references, and in some cases, appendices. Refer to other abstracts relating to their program for information on the types of data included.

ABSTRACT

Accession Number:
@ 852
White River Shale Project, May 1976, (Quarterly report no. 7, period from March 1, 1976 to May 31, 1976,) environmental baseline data collection and monitoring program, Tracts U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE, UTAH, RECLAMATION

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the seventh summary report for tracts U-a and U-b filed under this baseline program, and it covers the period from March 1, 1976 through May 31, 1976. This report includes the second-year monitoring programs for water, air and biology. The soils and geology and historic and scientific resources programs are complete and are not reported. The surface water section presents a series of time plots for several stations for the period October 1975 through September 1976 for major, minor, and trace elements. The groundwater section includes plots of monthly measured static water levels in 45 wells for the period October 1974-May 1976 on the near tracts.

ABSTRACT

Accession Number:
@ 853
White River Shale Project, May 1976, First year environmental baseline report, Tracts U-a and U-b v. 1: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE, UTAH

Access Code: 011 Use Code: 01

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. This is volume 1 of a two-volume report which summarizes and interprets the first year of baseline data from tracts U-a and U-b. It covers data collected from the beginning of each program in 1974 through January 15, 1976. Data from this period are also summarized in quarterly reports (Abstract Nos. 857-861). The sub-elements of this baseline study include water resources, air resources, biological resources, soils and geology, historic and scientific resources, and aesthetics. Each sub-element section discusses program objectives and experimental methods, summarizes results, and reports on conclusions, significant findings, or problems encountered. A discussion of changes proposed for the second year of monitoring is provided.

Volume 1 includes the water and air resources programs. The surface water hydrology section includes information on streamflow quantities, stream chemical water quality, suspended sediment loads, precipitation patterns and amounts, bottom-sediment chemistry and size distribution, and evaporation quantities. It includes isoheytal maps of precipitation in the Upper Colorado River Basin and in the vicinty of the tracts and plots of mean daily temperature, streamflow and specific conductance and of mean monthly quality (Co_3, HCO_3, Cl, F, Si, Ca, Mg, Na, K, So_4, pH, Do, sediment, and others) at six surface water stations. An appendix presents statistical summaries of surface water quality data. The groundwater section includes information on aquifer hydraulic properties, groundwater movement, water level fluctuations, areal extent of aquifers, groundwater quality and sources of recharge and discharge. It includes continuous well-level monitoring data for four wells; time plots for 33 wells of monthly static water levels; and statistical (mean, standard deviation, maximum, minimum) tabulations of well quality data.

ABSTRACT

Accession Number:
@ 854
White River Shale Project, Dec. 1976, Work plan, lease suspension period, environmental programs, Nov. 1, 1976 - Oct. 31, 1977: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: UTAH, ENVIRONMENTAL

Access Code: 011 Use Code: 01

Operations under the Ua/Ub leases were suspended effective November 1, 1976 - November 1, 1977. This postponed the implementation of the program described in the 1976 Detailed Development Plan. The lease terms were suspended because the Environmental Baseline Program detected levels of airborne ozone and non-methane hydrocarbons which exceed Federal National Ambient Air Quality Standards. This situation precludes proceeding with development as described in the DDP until the regulations were modified or provisions were made for allowing construction of facilities in areas which do not meet air quality standards under natural conditions.

The suspension period, therefore, was a time period which did not have a work plan. This document fills that gap, and outlines a plan of work. The report includes sections on the baseline environmental monitoring program, the interim environmental monitoring program, and the revegetation study. The Interim Program sections discuss objectives, methods, data analysis and reports, and rationals for monitoring programs on surface water, deep aquifers, alluvial aquifers, precipitation/evaporation, air quality, meteorology, vegetation, terrestrial biology, and aquatic biology.

ABSTRACT

Accession Number:
@ 855
White River Shale Project, 1976, (Quarterly report no. 9, Sept. 1, 1976 to Nov. 30, 1976,) environmental baseline data collection and monitoring program, Tracts U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: UTAH, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the ninth summary report for tracts U-a and U-b filed under this baseline program, and it covers the period from September 1 to November 30, 1976. This report is the final quarterly baseline report. It interprets and analyzes data that is reported in the Final Environmental Baseline Report (Abstract No. 851) and includes sections on water resources, air resources, and biological resources. This report updates the time plots of surface water quality and the continuous well level monitoring data from report no. 8 (Abstract No. 856).

ABSTRACT

Accession Number:
@ 856
White River Shale Project, 1976, Quarterly report no. 8, June 1, 1976 to Aug. 31, 1976, environmental baseline data collection and monitoring program, Tracts U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: UTAH, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE, RECLAMATION, SURFACE,

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the eighth summary report for tracts U-a and U-b filed under this baseline program, and it covers the period from June 1 through August 31, 1976. This report is one of two final quarterly baseline reports, and it interprets and analyzes data that will be incorporated within the Final Environmental Baseline Report (Abstract No. 851). This report updates the time plots of surface water quality and wells levels presented in the report no. 7 (Abstract No. 852) and includes hydrographs for White River near Watson and Evacuation Creek, below Watson and continuous monitoring data (well levels) from December 1974 for four wells.

ABSTRACT

Accession Number:
@ 857
White River Shale Project, 1976, (Quarterly report no. 6, Dec. 1, 1975 to Feb. 29, 1976,) environmental baseline data collection and monitoring program, Tracts U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: UTAH, SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the sixth summary report for tracts U-a and U-b filed under this baseline program, and it covers the period from December 1, 1975 through February 29, 1976. Sections are included on water resources, air resources, biological resources, geology and soils, historic and scientific resources, revegetation studies, and the geologic exploration plan. This report interprets and analyzes data that will be incorporated within the First Year Environmental Baseline Report (Abstract No. 853). The water resources section summarizes data on surface water (streamflow, precipitation, evaporation); surface water quality (White River, Evacuation Creek, Hells Hole Canyon, Southam Canyon, Asphalt Wash); groundwater levels; and groundwater quality. The air resources section summarizes data on meterology (surface and upper air meterology); diffusivity; air quality (gaseous pollutants, particulates, trace metals, visibility); radiation; and sound levels.

ABSTRACT

Accession Number:
@ 858
White River Shale Project, 1975, (Quarterly report no. 5, period ending Nov. 30, 1975,) environmental baseline data collection and monitoring program, Tracts U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE, RECLAMATION, SURFACE, UTAH

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the fifth summary report for tracts U-a and U-b filed under this baseline program, and it covers the period from September 1, 1975 through November 30, 1975. Sections are included on water resources, biological resources, geology and soils, historic and scientific resources, revegetation studies, geologic exploration program, aesthetics. The water resources section presents progress and summary data on surface water quantity and quality, groundwater quantity and quality, and on an aquifer test program. The air resources section presents progress and summary data on programs in surface meteorology, diffusivity, air quality, radiation, and sound levels.

This report presents a partial interpretation and analysis of one year's data for the surface and groundwater and air resources baseline programs. Analysis and interpretation of all baseline monitoring programs are included in the First Year Environmental Baseline Report (Abstract No. 853). The completed geologic subsidence program and aesthetics programs are also summarized.

ABSTRACT

Accession Number:
@ 859
White River Shale Project, 1975, Quarterly report no. 4 period ending Aug. 31, 1975, environmental baseline data collection and monitoring program, Tracts U-a and U-b: for U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE, RECLAMATION, SURFACE, UTAH

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the fourth summary report for tracts U-a and U-b filed under this baseline program, and it covers the period from June 1, 1975 through August 31, 1975. Sections are included on water resources, air resources, biological resources, geology and soils, historic and scientific resources, revegetation studies, the geology exploration program, and aesthetics. Figures include time plots of streamflow, and various water quality parameters, piezometric contours, and graphs of diurnal variation in air temperatures. Monitoring data are compiled from the beginning of the program to the present for the water and air resources programs. No surface water discharge and quality records from October 1974 to the present are compiled and are presented in graphic form along with groundwater elevations, compiled from December 1974. Air resources data are correlated with comparable information from previous years.

ABSTRACT

Accession Number:
@ 859.1
White River Shale Project, 1975, Quarterly progress report no. 3, period ending May 31, 1975, environmental baseline data collection and monitoring program, tracts U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program, 169 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: UTAH, SURFACE WATER QUALITY, SURFACE WATER QUANTITY, GROUNDWATER QUALITY, GROUNDWATER QUANTITY, CLIMATE, RECLAMATION, SURFACE

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the third summary report for tracts U-a and U-b filed under this baseline program, and it covers the period from March 1, 1975 through May 30, 1975. Sections are included on water resources, air resources, biological resources, geology and soils, historic and scientific resources, revegetation studies, and the geologic exploration plan. Figures include sediment and other water quality discharge relationships, continuous well monitoring data and contours of groundwater surface. Monitoring data are compiled from the beginning of the program to the present for the water and air resources programs. Surface water discharge and quality records from October 1974 to the present are compiled and are presented in graphic form along with ground water elevations. Air resources data are correlated with comparable information from previous quarters and where possible, from previous years. Results are also shown of laboratory analyses of tract metals and radioactivity in all samples collected during the baseline program.

ABSTRACT

Accession Number:
@ 860
White River Shale Project, 1975, (Quarterly report no. 2, period ending Feb. 28, 1975,) environmental baseline data collection and monitoring program for Tracts U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program, 53 p.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE, RECLAMATION, SURFACE, UTAH

Access Code: 011 Use Code: 02

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the second summary report for tracts U-a and U-b filed under this baseline program, and it covers the period from December 1, 1974 through February 18, 1975. Sections are included on water resources, air resources, biological resources, geology and soils, historic and scientific resources, the geologic exploration program, and revegetation studies. A pocket map shows the location of monitoring stations. Figures show geologic cross sections and time plots of continuous monitoring well water levels.

ABSTRACT

Accession Number:
@ 861
White River Shale Project, 1975, (Quarterly report no. 1, period ending Nov. 30, 1974,) environmental baseline data collection and monitoring program, tracts U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program, 59 p. plus appendices.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, CLIMATE, RECLAMATION, SURFACE, UTAH

Access Code: 011 Use Code: 03

The Prototype Oil Shale Leasing Program requires that leasees conduct two years of environmental baseline studies prior to tract development. These studies include plant ecology, animal ecology, aquatic ecology, water quality, hydrology and air quality. The resulting data were filed on a quarterly basis with the U.S. Geological Survey, Area Oil Shale Supervisor's Office, Grand Junction, Colorado. Summary reports were prepared describing the type of data filed and presenting interpretations, as appropriate.

This is the first summary report for tracts U-a and U-b filed under this baseline program, and it covers the period from plan approval (August for most elements) through November 30, 1974. The report presents an initial data summary, preliminary data interpretations, and projected work schedules. Sections are included on water resources, air resources, biological resources, geology and soils, historic and scientific resources, fish and wildlife management, geologic exploration, and revegetation. Appendices summarize water quality data, describe the air quality baseline monitoring program, present the results of soil chemistry and infiltration tests, and present a proposal for on-site revegetation and for geologic exploration.

ABSTRACT

Accession Number:
@ 862
White River Shale Oil Co., Sun Oil Company, Phillps Petroleum Company; June 1974, Discussion Draft, Partial exploration plan environmental baseline data collection and monitoring element, federal oil shale prototype leasing program Tracts U-a and U-b: U.S. Dept. of Interior, prototype oil shale leasing program.

Contact: Area Oil Shale Supervisor's Office (loan)
Environmental Advisory Panel (loan)

Key Categories: UTAH, ENVIRONMENTAL

Access Code: 132 Use Code: 03

This Partial Exploration Plan details the respective plans for implementing a coordinated environmental program on both Tracts U-a and U-b by the Sun Oil Company and Phillips Petroleum Company, and the White River Shale Oil Company. This program, which includes collecting baseline data and establishing comprehensive environmental monitoring activities to be conducted through the initial two-year period, will clearly define and document the environmental conditions that exist on the tracts prior to any development. This will provide the essential predevelopment planning information which, along with engineering the economic data, will provide a basis for the physical planning and design of oil shale mining and processsing facilities and preparation of the Detailed Development Plan.

The program proposed to be conducted on and adjacent to the tracts includes:

(1) Pre-Exploration Environmental Investigations;

(2) Environmental Baseline Data Collection and Monitoring Programs, including:

- Surface and Ground Water Resources Investigation and Sampling
- Air Quality and Meteorological Monitoring
- Biological Resources Investigation
- Geology, Soils and Seismicity Surveys

In addition to these environmental programs, the Operators have included preliminary plans for fish and wildlife management, erosion control, surface rehabilitation, and site facilities, as well as other special interrelated program activities.

ABSTRACT

Accession Number:
@ 863
Wilber, C.G., April 1974, Evaluation of the oil shale industry upon the water quality of the Piceance Basin, Rio Blanco and Garfield Counties, Colorado: ROSS - 26, Boulder, Colorado, Thorne Ecological Institute.

Contact: Colorado State Library (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY, ENVIRONMENTAL

Access Code: 011 Use Code: 02

This report presents the results of a study on water quality and toxicology of the Piceance Basin. The study is based upon a field reconnaissance of the area and a review of the literature. The purpose of the study was to establish baseline occurrences of toxic substances in aquatic and terrestrial ecosystems.

Water samples were collected for routine chemical analysis (temperature, pH, Cl, NO_3, F, hardness, conductivity, Mg, Ca) from 19 stations in the Piceance Creek Basin during the summer of 1973. Additional samples were collected during August 3-5, 1973, at 10 stations for detailed trace element analysis by spark source mass spectrometry. The results of these analyses are summarized and discussed. This information is used to develop a qualitative assessment of the potential impacts of an oil shale industry on water quality. The report focuses on surface water impacts, discussing salinity, leaching, and water supply.

ABSTRACT

Accession Number:
@ 863.1

Wilber, C.G., July 1973, Water quality inventory analysis and impact study of the Parachute Creek area, Garfield County, Colorado: report prepared by Thorne Ecological Institute for Colony Development Operation, in Appendix v. 7-9, Chapter IX, The Colony Environmental Study, Parachute Creek, Garfield County, Colorado, Colony Development Operation, An Environmental Impact Analysis for a Shale Oil Complex at Parachute Creek, Colorado.

Contact: BLM - Vernal (loan)
BLM - Craig (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 002 Use Code: 02

This report collates and interprets existing surface water quality data and presents some new data on streams within the Dow property. This report makes extensive use of water quality data from the Colony files and reports new analyses from 14 stations within or near the property. This information is used to predict the probable consequences of construction and operation of an oil shale plant and to identify methods to mitigate any pollution.

ABSTRACT

Accession Number:
@ 864
Wilber, C.G., May 1973, Water quality in the Piceance Creek basin, Rio Blanco and Garfield counties, Colorado: Boulder, Colorado, Thorne Ecological Institute, 63 p.

Contact: Colorado State Library (loan)

Key Categories: COLORADO, SURFACE WATER QUALITY

Access Code: 011 Use Code: 02

This report summarizes the results of a field study of the water quality of the Piceance Basin and adjacent areas. The report also contains a bibliography on water quality of the area, on available mathematical models in 1973, and on oil shale toxicology. The toxicology bibliography summarizes a number of references from the Russian literature. Appendices summarize information on potential uses of water from the White River in Colorado, Colorado water quality criteria, and available flow and water quality data for the area.

Twelve stations along the Piceance, Black Sulphur, and Yellow Creeks, the White River, and Dry Fork were sampled from October 6-9, 1973. In-situ measurements were made of pH and dissolved oxygen. The samples were also analyzed for temperature, NO_3, PO_4, F, Al, Cu, and Zn. The resulting analyses are summarized and discussed in this volume.

ABSTRACT

Accession Number:
@ 865
Wildeman, T.R.,and Hoeffner, S.L., 1981, Paraho waters - characteristics and analysis of major constituents: in Jackson, L.P., and Wright, C.C., eds., Analysis of waters associated with alternative fuel production, ASTM STP 720, p. 129.

Contact: Tom Wildeman (copy)

Key Categories: EFFLUENTS, SURFACE

Access Code: 011 Use Code: 01

Eight types of water samples were obtained from the Paraho above-ground oil shale retort. These samples include three from different sampling sites on the retort, two from different sites in the oil storage facilities, and three samples from different sites at the evaporation pond. Analyses of the pH, oxidizing capacity as Eh, conductivity, alkalinity, ammonia, total sulfur, and thiosulfate are described. Also the results of these analyses are presented for water samples prepared and stored by different methods. Special methods were developed for the conductivity analysis. The results for the total sulfur analysis are doubtful; a number of problems are still to be solved for this analysis. The water parameters that appear to be most vulnerable to handing and storage are the pH and conductivity.

ABSTRACT

Accession Number:
@ 866
Wildung, R., and Zachara, J., 1982, Effects of oil shale solid waste disposal on water quality: current knowledge, information requirements, and research strategy: in Petersen, K.K., ed., Oil shale, the environmental challenges II, Golden, Colorado, Colorado School of Mines Press [in press 1982].

Contact: Ray Wildung (copy)
Kathy Petersen (status)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 02

This paper is an extension of a recent, more detailed review of aboveground retorting and the geochemistry/hydrology of oil shale solid waste disposal that was presented in the first symposium in this series "Oil Shale, The Environmental Challenges". It briefly describes the key environmental issues associated with waste disposal in the developing oil shale industry, the role of the research community in resolving these issues, and a conceptualized approach for integrating current knowledge, identifying critical information needs, and conducting research to predict impacts of solutes from solid wastes on water quality and facilitate development of acceptable solid waste management strategies. The paper presents a mathematical framework, i.e., model, for predicting water and solute movement in a sent disposal piles and summarizes some recent research results from the Paraho Anvil Points lysimeters under study at Battelle Pacific Northwest Laboratory.

ABSTRACT

Accession Number:
@ 868

Wildung, R.E., and Zachara, J.M., 1980, Geochemistry of oil shale solid waste disposal: in Petersen, K.K., ed., Oil shale, the environmental challenges, Golden, Colorado, Colorado School of Mines Press, p. 201-240.

Contact: Ray Wildung (copy)
Colorado School of Mines (copy)

Key Categories: LEACHING, SURFACE

Access Code: 011 Use Code: 01

This paper examines the relationship of oil shale development and disposal of solid wastes produced by aboveground shale oil extraction processes to surface and groundwater quality in the Piceance Creek basin of northwestern Colorado, and identifies key areas of research necessary to the quantitative assessment and the mitigation of impact.

The contents of this report are the same as Volume 4: "Solid Waste for Mining and Surface Retorts: Western Oil Shale Development, A Technology Assessment" by Battelle Pacific Northwest Laboratory (1982)

The report discusses several proposed surface retorting processes, the chemical and mineralogical composition of raw and spent shale, and proposed spent shale disposal plans. It also overviews the research that had been completed as of August 1980 on the leaching of surface spent shales. It summarizes in tabular format, the elemental and minerological composition of Paraho, TOSCO and Union spent shales and the elemental composition of TOSCO and Paraho raw and spent shale leachates. The paper also reviews data on the surface and the groundwater quality in the Piceance Creek basin.

ABSTRACT

Accession Number:
@ 870
Willardson, L.S., and others, 1979, Impact of water and soils having high source-sink potentials on water and salinity management under irrigation in the Upper Colorado River Basin: Utah Water Research Laboratory, 101 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: SURFACE WATER QUALITY, GROUNDWATER QUALITY, SALINITY, COLORADO, WYOMING, UTAH

Access Code: 182 Use Code: 02

Water management in irrigation projects is one potential method for reducing downstream salinity in the Colorado River. An important contribution can be made to developing more effective irrigation water management practices for water conservation and salinity control through identification and better understanding of the soil and water interactions that result in soils behaving as salt sources or as salt sinks. The interactions identified in this study were examined to determine the effects of various management alternatives on the quality and quantity of salt in subsurface return flow from irrigation projects.

A soil solution chemistry model was developed to describe the soil-irrigation water interactions. The model includes the effect of cation exchange capacity. The model was calibrated and checked with data obtained from lysimeters. A water management model that contained a soil solution chemistry component was calibrated for the Ashley Valley of Utah and was used to determine the sensitivity of stream flows and salinity to irrigation water management alternatives.

The source-sink behavior of soils was found to depend on water quality, residual soil salinity, and water management practices. The key relationships are described. In applying these relationships, site specific conditions must be examined to determine the effectiveness of proposed irrigation management changes that are expected to affect downstream salinity.

ABSTRACT

Accession Number:
@ 871
Williams, J.S., 1975, The natural salinity of the Colorado River:
Utah Water Research Laboratory Occasional Paper 7, 18 p.

Contact: Utah Water Research Laboratory (copy)

Key Categories: SALINITY, UTAH, WYOMING

Access Code: 011 Use Code: 02

This article describes natural sources of salinity in the Upper Colorado River Basin. The natural salinity of this river system originates from dissolution of Mancos and other shales and from faults in the stream beds which bring deeply circulating saline water to the river and salt domes that lie in the path of some tributaries.

ABSTRACT

Accession Number:
@ 873
Wong, A.L., and Mercer, B.W., 1980, Contribution of thiosulfate to chemical and biochemical oxygen demand in oil shale process waters: in Jackson, L.P., and Wright, C.C., eds., Analysis of waters associated with alternative fuel production, ASTM STP 720, p. 56.

Contact: Basil Mercer (copy)
ASTM (copy)

Key Categories: EFFLUENTS, IN-SITU

Access Code: 011 Use Code: 03

Thiosulfate accounted for a significant portion of the chemical oxygen demand (COD) (7 to 20 percent) and the biochemical oxygen demand (BOD) (14 to 41 percent) of the four oil shale process waters studied. Accurate measurement of the thiosulfate oxygen demand of retort water is critical in assessing its environmental impacts on receiving waters and in designing biological treatment systems to treat it. The contribution of thiosulfate to the COD of oil shale retort waters can be accurately measured in a standard COD test. The BOD of thiosulfate in retort water is more difficult to determine and may require the development of a special thiosulfate-acclimated seed. Thiosulfate recovery of a known thiosulfate spike ranged from 92 to 100 percent in the COD test and from 54 to 119 percent in the BOD test. Considerable variability in recovery was found between the process waters studied. When determining the BOD of oil shale process waters, care must be taken to insure that there is a viable population of thiosulfate-oxidizing bacteria.

ABSTRACT

Accession Number:
@ 874
Woolley, R.R., 1946, Cloudburst floods in Utah, 1850-1938: U.S. Geological Survey Water-Supply Paper 994, 128 p.

Contact: USGS Library (copy)

Key Categories: FLOODS, UTAH

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 875
Woolley, R.R., 1930, The Green River and its utilization: U.S. Geological Survey Water-Supply Paper 618.

Contact: USGS Library (copy)

Key Categories: UTAH, COLORADO, WYOMING, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 02

Purpose and scope of report.—The purpose of this report is to present the facts regarding the available water supply of the Green River Basin and other data that will be helpful in planning to put this water to beneficial use. For some parts of the basin a mass of information is available; for other parts the data are less complete. An attempt is made in this report to present an analysis of all this information, supplemented by personal field studies, in such a way as to indicate the economic factors involved in utilizing the waters of the basin, and also to give facts from which the relative value of the irrigation and power projects may be readily deduced.

ABSTRACT

Accession Number:
@ 876
Wright Water Engineers, Inc., 1973, Preliminary water supply strategy for one oil shale plant in Parachute Creek Basin: in appendix 12, An environmental impact analysis for a shale oil complex at Parachute Creek, Colony Development Operation, Colorado, 83 p.

Contact: BLM - Craig (loan)
BLM - Vernal (loan)

Key Categories: COLORADO, SURFACE WATER QUANTITY, PROCESS WATER USE, SURFACE

Access Code: 011 Use Code: 02

A preliminary water resources strategy was completed for the operation of one oil shale plant by the Colony Development Operation in the Parachute Creek Basin. Consideration was given for the development of both a physical and legal water supply. The assumed quantity necessary to supply the operation of one oil shale plant on a continuous year-round basis was 12 cfs. This included the amount necessary to supply a supporting municipality of approximately 6,000 people.

The preliminary findings of this report indicate that the Dow Pumping Pipeline, which diverts out of the Colorado River, would be a good primary water source for the oil shale plant. Storage releases from Green Mountain Reservoir and/or other reservoirs available to Colony Development Operation would provide the necessary back-up water supply during drought periods. The combination of the direct flow right with storage releases will provide a firm legal and physical water supply for the oil shale plant.

ABSTRACT

Accession Number:
@ 877
Wymore, I.F., 1974, Estimated average annual water balance for Piceance and Yellow Creek watersheds: Colorado State University, Environmental Resources Center, Technical Report Series No. 2., 60 p.

Contact: Environmental Resources Center (copy)

Key Categories: COLORADO, SURFACE WATER QUANTITY, AVAILABLE WATER BY BASIN, CLIMATE

Access Code: 011 Use Code: 01

This report provides a surface water balance estimate by elevation zones and vegetation types for the Piceance and Yellow Creeks watersheds. The original purpose of this study was to provide the U.S. Geological Survey with data for checking and calibrating the ground-water model for the Piceance Basin, but the resulting estimates have considerable application in answering plant water use questions related to the developing oil shale industry. The estimates developed are generally consistent with known water balance factors and vegetation indicators, but the water balance model is based on linear relationships to the maximum possible extent and the necessary simplifying assumptions ignore a number of complex relationships.

The water balance evaluations for Piceance Creek watershed (629 sq. miles) provide average annual precipitation estimates of 17.40 inches, of which 17.01 inches are used by evapotranspiration, and the net outflow is 0.39 inch. In terms of acre-feet this would be a net outflow of 13,102 acre-feet which checks with the available stream-gaging records for Piceance Creek at the White River if estimated irrigation by-pass at the gaging site is considered. The Yellow Creek watershed (258 sq. miles) water balance study estimates an average precipitation of 15.67 inches, with 15.58 inches evapotranspiration, and 0.19 inches (2,578 acre-feet) net outflow. The evaluations, as conducted, also provided specific estimates of water use by native vegetation, irrigated cropland, sagebrush bottomland and seep or phreatophyte areas, and a division of evapotranspiration estimates for each vegetation type during the November-March and April-October periods.

ABSTRACT

Accession Number:
@ 878
Wymore, I.F., 1974, Water requirements for stabilization of spent shale: Ph.D. Dissertation, Fort Collins, Colorado State University, 152 p.

Contact: University Microfilms International (copy)

Key Categories: PROCESS WATER USE, RECLAMATION, SURFACE

Access Code: 002 Use Code: 01

Water is recognized as one of the critical factors in the future development and ultimate size of an oil shale industry. This study provides a model for estimating the water requirements for stabilization of spent shale. Since revegetation seems to offer the most environmentally acceptable method for long-term stabilization of surface disposal areas for spent shale and overburden materials, the study concentrates on the water requirements of revegetation.

The study provides equations for estimating the volumes of spent shale for a specific size industry, the surface area to be revegetated for dry canyon disposal areas, the water requirements for cooling, transporting and compaction of spent shale, and the irrigation water requirements for leaching and revegetation of surface disposal areas. Water requirements for revegetation are estimated by a modified Jensen-Haise method that permits monthly estimates of evapotranspiration on an annual basis for specific sites that vary as to vegetation type and density, elevation, slope, aspect, and mean monthly air temperatures.

The water requirements for a hypothetical 250,000 barrel per day commercial oil shale industry in the Piceance Basin of Colorado was evaluated on a 20-year and annual basis. This evaluation indicates that the water requirements for spent shale and overburden disposal account for about 40 percent, and revegetation accounts for about 6 percent of the total process water requirements for a commercial oil shale industry.

ABSTRACT

Accession Number:
@ 879
Wymore, I.F., 1973, Estimated water balance of Davis Gulch: for present conditions and after use for processed shale disposal: in appendix 6, of An environmental impact analyses for a shale oil complex at Parachute Creek, Colorado, Colony Development Operation, Denver, Colorado, 208 p.

Contact: BLM - Craig (loan)
BLM - Vernal (loan)

Key Categories: PRESENT WATER USE, RECLAMATION, SURFACE

Access Code: 011 Use Code: 02

This study develops a water balance for the Davis Gulch watershed for present conditions and during revegetation and assesses the long-term feasibility of establishing permanent vegetation on the processed shale disposal area from the standpoint of water availability. An estimate of the irrigation water required for leaching and rapid vegetation establishment is also provided.

ABSTRACT

Accession Number:
@ 880
Wyoming Department of Environmental Quality, 1978, Water quality, rules and regulations: Chapter 1 of Quality standards for Wyoming surface waters, Cheyenne, Water Quality Division, 16 p.

Contact: Wyoming Dept. of Environmental Quality (copy)

Key Categories: WYOMING, WATER LAW

Access Code: 011 Use Code: 01

This document presents Wyoming's water quality rules and regulations. Standards have been set on 14 parameters, and they are based on the use of the water. The basis of the Wyoming standards is the preservation and protection of fish and aquatic life in all surface waters. To this end, three classes of water are designated as follows: Calss I - waters which presently support or could potentially support, game fish; Class II - waters which presently support or could potentially support, nongame fish; and Class III - waters which do not have the potential to support fish.

ABSTRACT

Accession Number:
@ 880.1
Wyoming State Engineer's Office, no date, Wyoming water rights well and surface water study study.

Contact: Margo Teague (copy)

Key Categories: WYOMING, GROUNDWATER QUANTITY, SURFACE WATER QUANTITY, WATER LAW

Access Code: 011 Use Code: 01

Computer printouts may be obtained of adjudicated and unadjudicated surface and ground water rights. The well study lists the location, usually to the nearest quarter-quarter section, whether the right is adjudicated and the type of record on file, the permit number, the status of the right, and well depth, the depth to the static water level, the well yield, the depth to the top or bottom of the main water bearing zone, well use, and an indication if a driller's log is on file.

The surface water study lists the certificate and permit number, the type of permit (ditch, reservoir, stock reservoir, etc.), division, district, proof, name and address of appropriator, type of facility (monitoring, commercial, domestic, drilling, etc.), source of water, tributaries listed in downstrean sequence to a major river or the next tributary out of state, name of reservoir if applicable, allocated acre feet, priority date, status, diversion points or outlet location to nearest 40 acre subdivision, and other information.

ABSTRACT

Accession Number:
@ 880.2
Wyoming State Engineer's Office, 1978, Watershed investigations, working paper, Green River basin, Wyoming, type IV study: U.S. Dept. of Agriculture, Soil Conservation Service, Portland, Oregon.

Contact: none

Key Categories: WYOMING, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 02

This report summarizes investigations for watersheds in the Green River Basin. For each watershed, summary tables include: present and improved condition irrigation water management; irrigation cropping pattern and diversion shortages; storage site location and storage potential; geologic investigation of proposed reservoir sites; economic evaluation of changes in agricultural production with and without projects; benefit-cost analysis of alternative storage schemes; alternative cost analysis of storage operations; and, a preliminary environmental assessment of reservoir sites.

ABSTRACT

Accession Number:
@ 880.3
Wyoming State Engineer's Office, 1977, Base resources working paper, Green River basin, Wyoming, type IV study: U.S. Dept. of Agricultural, Soil Conservation Service, Portland, Oregon.

Contact: none

Key Categories: WYOMING, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 002 Use Code: 02

This working paper presents an overview of description, extent and availability of resources of the Green River Basin. The section on water resources briefly discusses streamflow; water quality; groundwater; water rights; interstate compacts and available water supplies; depletions from agriculture, energy and minerals, timber, and municipal and domestic uses; alternative municipal and industrial water requirement projections; and recreation, fish and wildlife. Water resources requirements are summarized, including potential sources of water and major irrigation projects that would affect water supply.

Much of the material presented in the water resources section is taken directly from the Wyoming Water Planning Program Report No. 3, Water and Related Land Resources of the Green River Basin, September 1970 (Accession No. 885).

ABSTRACT

Accession Number:
@ 881
Wyoming State Engineer's Office, July 1975, Compilation of observed and estimated streamflow data for the Green River basin, Wyoming, water years 1930-1973: State Engineer's Office Report No. 16, 66 p.

Contact: BLM - Cheyenne (loan)

Key Categories: WYOMING, SURFACE WATER QUANTITY

Access Code: 152 Use Code: 02

This report compiles monthly observed and estimated streamflow data for the Green River Basin for the period of record October 1, 1929 through September 30, 1973. This 44-year period includes the low flow years of the early 1930's as well as high flow years, and utilizes the most recent data available. The streamflow data compilations presented herein are for the stream gages reported by the U.S. Geological Survey in the Green River Basin in or near Wyoming during the 1930-1973 period. The final selection consisted of 60 stream-gage stations with sufficient record to be useful, plus storage contents records for Fontenelle and Flaming Gorge Reservoirs. One station, Green River below Fontenelle Reservoir, was not extended back in time.

The report consists of one table for each of these 60 stations which presents monthly and total annual streamflow for each year of record, as well as monthly averages for the entire period of record. An introduction discusses the methods used to extend existing records.

ABSTRACT

Accession Number:
@ 882
Wyoming State Engineer's Office, 1974, A water development program for Wyoming: Wyoming Water Planning Report.

Contact: Wyoming State Engineer (copy)

Key Categories: WYOMING, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 883
Wyoming State Engineer's Office, 1973, The Wyoming framework water plan: Wyoming Water Planning Program, 243 p.

Contact: John Jackson (copy)

Key Categories: SURFACE WATER QUANTITY, SURFACE WATER QUALITY, GROUNDWATER QUANTITY, GROUNDWATER QUALITY, AVAILABLE WATER BY BASIN, PRESENT WATER USE, WYOMING

Access Code: 011 Use Code: 02

The Wyoming Framework Water Plan indentifies the long-range (50-year) alternatives for meeting the water needs of the State. It is an inventory of the State's water resources and related lands, a summary of the State's present water uses, a projection of future water needs, and an identification of alternative decisions to meet or not to meet the future water needs.

The Wyoming Framework Water Plan indentifies a large number of alternative potential water resource projects and a range of decisions affecting water resource development. For the purposes of this study, Wyoming was divided into the seven river basins. The division was made where interstate stream compacts, court decrees, or the relationship of water to other natural resources provides a logical subdivision. A report was prepared for each river basin except for the drainages in Yellowstone National Park. This report summarizes the data on a statewide basis and shows the linkages or interconnections of the river basins to each other. Abstract No. 885 summarizes the report prepared for the Green River basin.

ABSTRACT

Accession Number:
@ 884
Wyoming State Engineer's Office, 1971, Documents on the use and control of Wyoming's interstate streams, compacts, treaties, and court decrees: Wyoming Water Resources Research Institute and Land and Water Law Center, Cheyenne, Wyoming.

Contact: DRI (loan)

Key Categories: WYOMING, WATER LAW

Access Code: 040 Use Code: 02

ABSTRACT

Accession Number:
@ 885
Wyoming State Engineer's Office, 1970, Water and related land resources of the Green River Basin, Wyoming: Wyoming Water Planning Program Report No. 3.

Contact: BLM - Cheyenne (loan)

Key Categories: WYOMING, PRESENT WATER USE, AVAILABLE WATER BY BASIN

Access Code: 152 Use Code: 03

The report discusses water and related land resources in the Green River Basin and provides a means of evaluating the water needs and resources of the Basin relative to the overall water needs and resources of Wyoming. The complete "State Water Plan" will incorporate this analysis of the Green River Basin in the formulation of a statewide plan, with alternatives, to develop the water and related land resources of Wyoming.

In this report, the present water uses in the Green River Basin are inventoried and future water needs are determined. Several plans are presented in which alternative water development facilities are proposed. The sizes of reservoirs and conveyance systems used in the plans were based upon available information. Costs were estimated to facilitate comparison of alternative plans. This report does not attempt to prescribe a course of action. Rather, it attempts to provide information so that practical decisions can be made by the citizens of Wyoming concerning future water and related land resource development in the State.

ABSTRACT

Accession Number:
@ 885.1
Wyoming Water Development Commission, 1980, Little Snake River water management project, feasibility study and substantiating report: report prepared by Banner Associates, Inc., Laramie, Wyoming.

Contact: Wyoming Water Development Commission (copy)

Key Categories: WYOMING, AVAILABLE WATER BY BASIN, PRESENT WATER USE

Access Code: 011 Use Code: 01

This report describes a study conducted to analyze the feasibility of constructing water development facilities to utilize the unused and unappropriated waters of the Little Snake River in Wyoming for both in-basin and out-of-basin needs. Possible in-basin uses include: supplemental supply for existing irrigation, full supply for new irrigation, domestic and municipal use, and industrial use. This study also evaluates the feasibility of construction of diversion and conveyance facilities to transport water from the Little Snake River basin to the North Platte River basin for municipal use by communities along the North Platte River.

Volume 1 of this report, Feasibility Study, contains an outline of the results of the study for general use. It overviews present irrigation and municipal development, presents an analysis of water needs, and discusses various water developments to meet in-basin and out-of-basin needs. Volume 2, Substantiating Report, includes detailed analyses of the hydrologic, geologic, engineering, cost, and environmental considerations involved in the development of the feasibility study. The reports and computer printouts referenced in this study are available in the offices of the Wyoming Water Development Commission.

ABSTRACT

Accession Number:
@ 886
Wyoming Water Planning Program, 1965, Mean annual precipitation of Wyoming as of 1965: Wyoming State Engineer Map, 1 sheet.

Contact: Wyoming State Engineer (loan)

Key Categories: WYOMING, CLIMATE

Access Code: 000 Use Code: 02

ABSTRACT

Accession Number:
@ 886.1
Yevdjevich, Vujica M., Oct. 1961, Some general aspects of fluctuations of annual runoff in the Upper Colorado River Basin: Fort Collins, Colorado, Colorado State University, Civil Engineering Section.

Contact: DRI (loan)

Key Categories: COLORADO, UTAH, WYOMING, SURFACE WATER QUANTITY

Access Code: 042 Use Code: 03

The fluctuations of annual river flows and derived effective annual precipitations (defined as precipitation minus evapotranspiration on an area) of the Upper Colorado River Basin are subjects of this study. The data for this study are composed of annual flows for 14 river stations in the Upper Colorado River Basin and around it, and of the annual flows of the key station of the Upper Colorado River, at Lee Ferry, Arizona.

Three statistical techniques were used: 1) distribution of the first serial correlation coefficient; 2) correlogram analysis; and 3) distribution of range. The series of annual flows and series of derived effective annual precipitations were compared with the same statistical characteristics of random time series. The comparison of these statistical parameters shows that the fluctuations of effective annual precipitations on river basins are very close to the fluctuations of random series.

Probability characteristics of random variables may be applied to annual river flows of the Upper Colorado River, provided due corrections are made for the effect of water carryover from year to year, and for non-homogeneity in data.

A discussion of hydrological characteristics of annual runoff in the Upper Colorado River Basin is given, with general conclusions of this study and some recommendations for further studies.

ABSTRACT

Accession Number:
@ 887
Zerga, D.P., Nov. 1978, Investigation of the Geokinetics horizontal in situ oil shale retorting process: revised quarterly report, July to Sept., 1978: 15 p. plus appendices (revised Feb. 1979).

Contact: NTIS (copy)
Neil Young (loan)

Key Categories: UTAH, GROUNDWATER QUALITY, EFFLUENTS, IN-SITU

Access Code: 002

Use Code: 03

This is a quarterly progress report covering the period July through September, 1978 under the U.S. DOE cooperative agreement with Geokinetics. Appendix B of this volume presents statistical summaries of groundwater quality analyses and retort water analyses.

ABSTRACT

Accession Number:
@ 887.1
Zeveloff, L., Parker, M., Marcus, M.D., and Bergman, H.L., 1980, Bibliography of aquatic ecosystem effects, anlaytical methods and treatment technologies for organic compounds in advanced fossil-fuel processing effluents - v. 2: Rep. EPA 600/3-80-086, 354 p.

Contact: NTIS (copy)

Key Categories: BIBLIOGRAPHY, EFFLUENTS, SURFACE, IN-SITU, ENVIRONMENTAL

Access Code: 002 Use Code: 02

This bibliography includes 1314 citations which are indexed by chemicals, keywords, taxa, and authors. The bibliography was compiled from computerized literature searches and covers the topics of aquatic ecosystem effects, analytical methods, and treatment technologies for organic compounds. These citations are available on a computer system at the University of Wyoming and may be accessed by contacting Harold Bergman (307-766-4430).

ABSTRACT

Accession Number:
@ 887.2
Zimmerman, E.A., 1981, A preliminary hydrologic investigation of an in-situ oil-shale retorting site near Rock Springs, Wyoming, project summary in Water-resources investigations of the U.S. Geological Survey in Wyoming, Fiscal Year 1980, Open-File Report 81-20, p. 83-84.

Contact: Everette Zimmerman (status)

Key Categories: WYOMING, IN-SITU, EFFLUENTS, LEACHING, ENVIRONMENTAL

Access Code: 011 Use Code: 02

The purpose of this study is to collect and publish hydrologic and water-quality data from within and adjacent to the combustion zone of an in situ process. The study is being conducted at Laramie Energy Technology's Site 9 true in situ experimental site near Rock Springs, Wyoming. Samples are being collected from existing LETC wells and from new wells drilled by the USGS and analyzed for major, minor and trace elements and standard water quality parameters. These data are available in WATSTOR. In addition, sulfur speciation and organic characterizations are being performed on some samples. This information is not available on WATSTOR. A flow and solute transport model will be developed for this site.

ABSTRACT

Accession Number:
@ 888
Zimmerman, E.A., and Collier, K.R., 1982, Ground-water data, Green River basin, Wyoming: U.S. Geological Survey Water-Resources Investigation, [in preparation 1982-1983].

Contact: Everett Zimmerman (status)

Key Categories: WYOMING, GROUNDWATER QUANTITY, GROUNDWATER QUALITY

Access Code: 002 Use Code: 01

This basic data report tabulates available groundwater quality and well level data for the Green River Basin, Wyoming. Much of this information has not been previously published, and it includes well records from the State Engineer's Record of Wells, oil company data, and other non-USGS sources.

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